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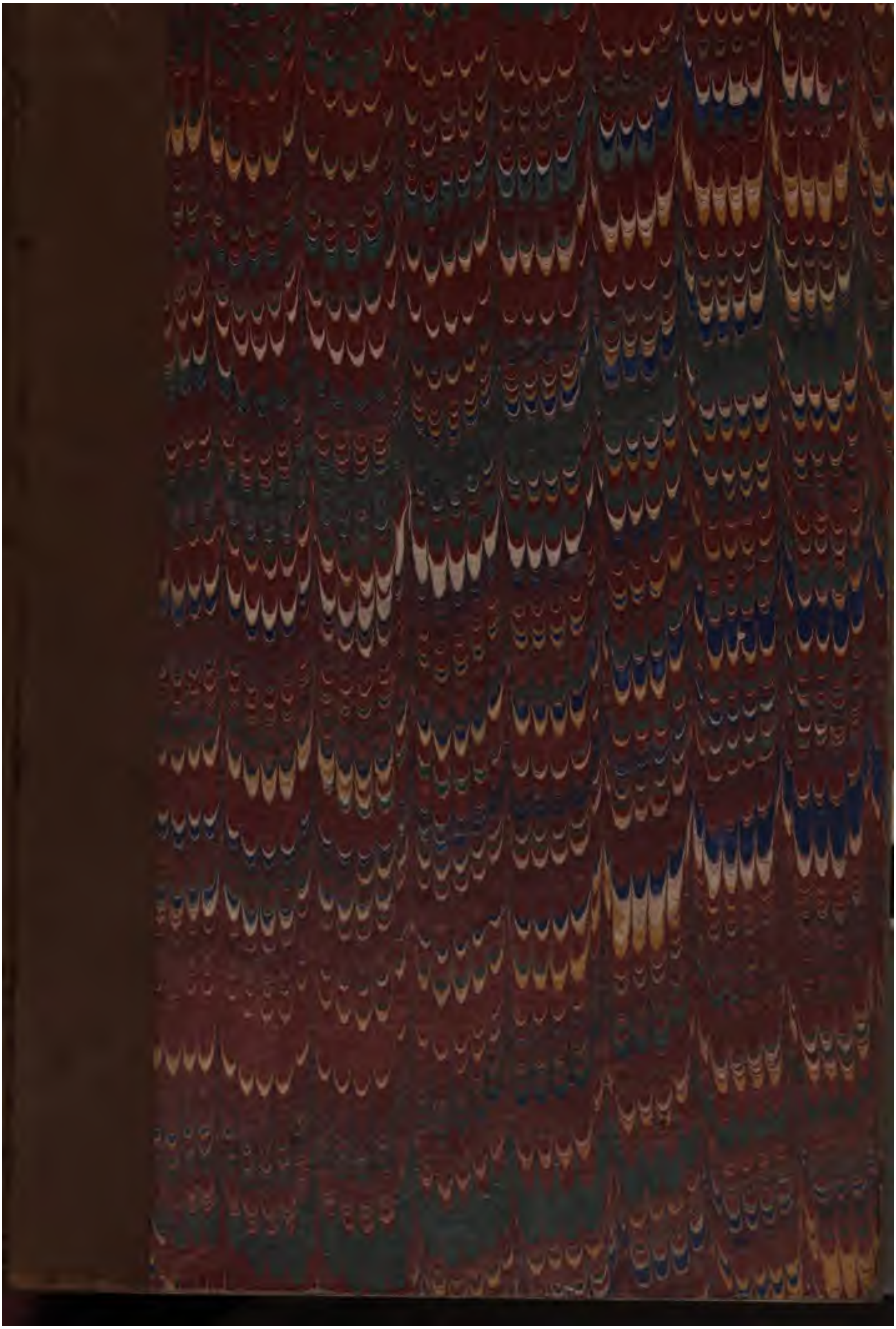

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pt. 72

PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

MILKING, CHURNING, AND CHEESE-MAKING.

A.D. 1777–1866.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.

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PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866 amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct inventions, and many of those filed under the new law of 1852 indicate various applications of the single invention to which the Patent is limited. Considering, therefore, the large number of inventions and applications of inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will, from time to time, become apparent, and be supplied in future editions.

This volume contains Abridgments of Specifications to the end of the year 1866. From that date the Abridgments will be found in chronological order in the "Chronological "and Descriptive Index" (*see* List of Works at the end of this book). It is intended, however, to publish these Abridgments in classes as soon as the Abridgments of all the Specifications from the earliest period to the end of 1866 have appeared in a classified form. Until that takes place, the reader (by the aid of the Subject-matter Index for each year) can continue his examination of the Abridgments relating to the subject of his search in the Chronological and Descriptive Index.

The scope of the present series is fully explained by its title. It embraces only the inventions relating to the processes of obtaining milk and manufacturing butter and cheese. Inventions merely dealing with the finished product, such as the employment of milk, butter, or cheese in cooking, have been excluded, and will be found in the series entitled "Cooking, Bread-making, and the Preparation of "Confectionery." Those referring to the manufacture of "artificial" milk and butter have been admitted, but not any in which processes or apparatus for the preservation of milk, &c. are described. The latter have already been treated in the series of Abridgments devoted to the subject "Preservation of Food."

B. WOODCROFT.

December, 1874.

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INTRODUCTION.

In one form or another milk has formed a part of man's food in every part of the world and amongst every nation. It is of course under the three forms of milk, butter, and cheese that it or its manufactured products are principally consumed, though there are other forms in which milk is used as food, of these it may be sufficient to mention curds and whey, which are employed for food in their natural condition, koumiss, a fermented preparation made of mare's milk by the Tartars, and syllabub. It will be convenient to arrange these few prefatory remarks under the three heads, milk, butter, and cheese.

In various countries different animals have been used to provide milk for the use of man, in fact, it seems probable that every domestic animal except those which are carnivorous has been put to this service. Besides the cow, from whom our principal supplies are provided, the following animals are commonly used in their respective countries :—The goat in most mountainous countries, to some extent even in England, and in many parts,—e.g., of Switzerland—almost to the exclusion of the cow; the sheep in many pastoral countries, in former times to some extent in England; the rein-deer in Lapland; the camel by the Bedouins and others who use this animal; the sow in China; the mare by many central Asian tribes; the ass commonly in various countries for the special use of invalids.

Even the vegetable kingdom is not without its sources of milk supply. There are several plants yielding a juice which is used as milk in the countries where the plants grow. Such are the Hya-Hya (*Tabernœmontana utilis*) or cow-tree of Demerara; the cow-tree of Brazil (*Galactodendron utile*), the "Palo di vacca" of the South Americans; the cow-plant of Ceylon (*Gymnema lactiferum*) and the Massarandubа of Parà, also, like the above, known as the "cow-tree," from its lactiferous properties. Of this last an account is given in the *Journal of the Society of Arts* by Mr. Bruce Warren, who proposes it as a new source for india-rubber. It is also described by Mr. Bates in his "Naturalist on the Amazons"[*] and by Mr. Kingston in his "Narrative of the Banks of the "Amazons."[†]

As may well be supposed, the milk furnished by the animals above mentioned is very different in its qualities. If we compare different kinds of milk with reference to their solid constituents we find that ass's milk is most dilute, containing scarcely 9 per cent. solid matter; next stands human milk, with somewhat over 11 per cent.; next goat's milk with 13½ per cent.; next cow's milk with over 14 per cent.; then sheep's milk containing 16 per cent. (according to an analysis recently made even 18 per cent.); lastly, mare's milk, containing 17 per cent. With reference to their medicinal effects on the human system it would appear from these facts ass's milk would be applicable in cases where dilute milk seems desirable. Goat's and cow's milk represent the average quality; sheep's milk would be suitable when that containing a large amount of nourishment is thought necessary, and it is preferable to the rich mare's milk, which in the central parts of Europe is also frequently applied to therapeutic purposes, because it contains a larger quantity of albumen and casein. Still more important than the total amount of the solid matter is the amount of casein and albumen. Excepting mare's milk, which is excessively poor in this respect, human milk is the poorest, containing only 4 per cent. of casein, whilst cow's milk contains nearly 5 per cent. with more than ½ per cent. albumen. In direct opposition to the latter stands ass's milk, with only 2 per cent. casein and albumen; for this reason it is sometimes employed in inflammable chronic diseases, in which the supply of nitrogenous matter must be confined within moderate limits. Goat's milk, with 5⅔ per cent. of casein and albumen, is particularly characterised by its large amount of albumen, which is 1⅓ per cent., while sheep's milk is in this particular again the richest, since of 5⅓ per cent. of casein and albumen, as much as 1⅔ are albumen. Ass's milk contains also the smallest quantity of butter, whilst cow's and human milk contain 4½ per cent.; sheep's milk nearly 6 per cent.; goat's milk nearly 7 per cent. Goat's and sheep's milk contain again the largest amount of hydrocarbons; the sheep exhibiting the enormous value of the nourishing constituents of its milk by its containing 11¼ per cent. of proteine matters and hydrocarbons. The milk sugar amounts on the average to 4 per cent. in the milk of the cow, goat, and sheep, while there is more than 5 per cent. in the milk of the ass. The salts, chlorides of the alkalies, earths, etc., amount to ½ or ⅔ per cent. on the average in different kinds of milk. The large amount of milk sugar in mare's milk, viz., 8 per cent., only moderately increases its nutritive value, but renders it prone to alcoholic fermentation, whence arises its manifold application in the "koumiss" cure treatment practised amongst Tartar tribes.

---

[*] "We had already heard a good deal about this tree, and about producing
" from its bark a copious supply of milk, as pleasant to drink as that of the cow.
" We had also eaten its fruit in Parà, where it is sold in the streets by negro
" market-women, and had heard a good deal of the durableness in water of its
" timber. We were glad, therefore, to see this wonderful tree growing in its
" native wilds. It is one of the largest of the forest monarchs, and is peculiar
" in appearance on account of its deeply scored, reddish, and ragged bark. A
" decoction of the bark, I was told, is used as a red dye for cloth. A few days
" afterwards we tasted its milk, which was drawn from dry logs that had been
" standing many days in the hot sun, at the saw-mills. It was pleasant with
" coffee, but had a slight rankness when drank pure; it soon thickens to a
" glue, which is excessively tenacious, and is often used to cement broken
" crockery. I was told that it was not safe to drink much of it, for a slave had
" recently nearly lost his life through taking it too freely." *Bates* "The Natura-
" list on the River Amazons."

[†] "We went on a few yards further, when we stopped under an enormous
" tree, one of the giants of the forest. Its trunk was covered with deeply-
" scored reddish and rugged bark. Duppo patted it, saying 'This my cow.'
" Another tree of the same species, but much smaller, grew near. He ran to it,
" saying, 'Small cow give better milk,' and began to attack it with his axe.
" After making a few strokes, out flowed a perfectly white liquid, which John,
" kneeling down, caught in the monkey-cup. As soon as it was filled I handed
" him another, the milk continuing to flow in great abundance, so that we soon
" had four cups filled full of the tempting liquid. On tasting it we found it sweet,
" and of a not unpleasant flavour, and wonderfully like ordinary cow's milk. We
" returned to the hut with the prize. Domingos had meantime been boiling
" some coffee; as we had now no sugar, the fresh milk proved a most valuable
" acquisition. The Indians, however, recommended us not to take too much of
" it. We kept it, intending to use it again in the evening, but on taking off
" the lid of one of the monkey-cups we found that our milk had thickened
" into a stiff and excessively tenacious glue. 'My cow good?' asked Sappo,
" as he saw us tasting the liquid. When we showed him the gluey substance
" in the evening; he inquired sagaciously 'whether the milk of our cow would
" 'keep so long,' and we confessed that in that climate it would be very likely
" to turn sour. After this, on several occasions, we obtained fresh milk from
" the cow-tree for our breakfasts and suppers." *Kingston*, "Narrative of the
" Banks of the Amazons."

The following analysis has been made to show in a comparative form the various constituent parts of the milk of various animals :—

——	Woman.	Cow.	Ass.	Goat.	Sheep.
Casein - -	1·5	4·5	1·8	4·1	4·5
Butter - -	3·6	3·1	0·1	3·3	4·2
Milk Sugar - -	6·5	4·8	6·1	5·3	5·0
Saline Matter -	0·5	0·6	0·3	0·6	0·7
Water - - -	87·9	87·0	91·7	86·7	85·6
	100·0	100·0	100·0	100·0	100·0

The writer of this has not been able to discover any analysis of the milk of a carnivorous animal, though doubtless such have been made. It would be interesting to see in what way the milk of an animal whose food was entirely flesh, might differ from that produced by those wholly graminivorous. In considering these and any similar analysis, it must be remembered that they are only approximate. The milk of various individuals of different species, even of different individuals of the same species, varies within considerable limits according to the circumstances under which the individual was existing at the time of its production.

How very considerable such variations may be, is shown by the following table of analyses conducted by Dr. Voelcker on the milk of cows at the farm of the Royal Agricultural College, Cirencester. It is to be remembered that the milk in question was thus absolutely pure, and that as the tests were made on the milk of a herd, not of a single cow, one considerable element of variation was eliminated, and results obtained probably more nearly approaching an average than would have been the case with a scheme of experiments conducted on a more limited scale.*

---

* See Dr. Voelcker's paper on "Milk, its Supply and Adulteration," read before the Farmer's Club, March 1874.

COMPOSITION of MORNING and EVENING'S MILK produced on the Royal Agricultural College Farm, Cirencester.

——		Per-centage of					
		Water.	Butter (pure fat).	Casein and Albumen.	Milk-Sugar.	Mineral Matters (ash).	Nitrogen.
January -	Morning	87·70	2·60	2·94	5·82	·94	·47
	Evening	87·40	2·28	2·87	6·56	·89	·46
February -	Morning	87·50	2·58	3·44	5·44	1·04	·55
	Evening	86·40	3·53	3·37	5·56	1·14	·54
March -	Morning	88·60	2·71	2·43	5·35	·91	·39
	Evening	88·16	2·96	2·62	5·55	·77	·42
April -	Morning	87·50	3·15	2·94	5·60	·81	·47
	Evening	89·00	2·47	2·69	5·08	·76	·43
May -	Morning	88·20	2·42	3·12	5·49	·77	·50
	Evening	87·80	2·71	2·87	5·85	·77	·46
June -	Morning	87·30	3·05	3·00	5·89	·76	·48
	Evening	87·30	2·94	2·87	6·05	·84	·46
July -	Morning	88·70	2·22	2·94	5·38	·76	·47
	Evening	87·80	3·61	2·81	5·10	·68	·45
September	Morning	89·91	1·99	2·94	4·48	·64	·47
	Evening	90·70	1·79	2·81	4·04	·66	·45
October -	Morning	87·60	3·90	2·87	4·84	·79	·47
	Evening	90·30	2·99	2·37	3·76	·58	·38
November	Morning	87·10	3·41	2·94	5·41	1·14	·47
	Evening	86·20	3·78	3·19	5·68	1·15	·51
December	Morning	86·70	3·74	2·87	5·92	·77	·46
	Evening	86·00	4·12	3·62	5·46	·80	·58

The following, from analyses by Vernois and Becquerel, show the effects of disease, at all events on the human subject.

ANALYSES of HUMAN MILK in HEALTH and DISEASE.

——	Health.	Acute Disease.	Chronic Disease.
Water - - - -	889.08	884·91	885·50
Casein and Extractive matters	39·24	50·40	37·06
Sugar - - - -	43·64	33·10	43·37
Butter - - - -	26·66	29·86	32·57
Salts - - - -	1·38	1·73	1·50
	1,000·00	1,000·00	1,000·00

An instance of variation, still greater than that evidenced by Dr. Voelcker's analyses above quoted, is given by an analysis, also made by the same chemist, of some extremely rich country milk from cows in the possession of Mr. Harrison, of Frocester Court, Gloucestershire. This milk, produced from cows kept on very good pasture land, contained in 100 parts:—

Water	83·90
Fatty matters (pure butter)	7·62
Casein (curd)	3·31
Milk-sugar	4·46
Mineral matter (ash)	·71
	100·00
Per-centage of solid matters	16·10

It is to be noted, however, that such rich country milk seldom finds its way into the hands of milk dealers, nor does milk from cows fed exclusively upon grass often contain as much as 7½ per cent. of pure butter. These results may be compared with some of the poorer samples of the Cirencester milk, to show how wide is the margin for variation in milk undeniably pure and good.

Milk contains an azotised matter, casein, nearly identical with muscular flesh, fatty principles, a peculiar sugar, and lastly, various salts among which phosphate of lime is the principal, held in solution in a slightly alkaline liquid. The white appearance of milk is an optical illusion. Milk is really a transparent fluid in which float numbers of transparent globules of fat, each surrounded by an albuminous envelope.*

A quart of milk of fair average quality should weigh 2lb. 2¼oz. According to Professor Wanklyn, pure milk should have an average sp. gr. of 1·030, and should consist of the following proportions:—

Water	87·19
Solids	12·81
	100·00

The solids consisting of—

Butter	3·53
Casein	3·74
Sugar of milk	4·75
Ash	0·79
	100·00

---

* Fowne's Manual of Chemistry, Edit. 1856, p. 675.

Henri and Chevalier give the following as an analysis of cow's milk in the average condition :—

Butter	3·13
Casein	4·48
Sugar of milk	4·77
Ash	0·60
Water	87·02
	100·00

The most minute analysis that the writer of this has lighted upon is the following by M. Haidlen :*

Water	873·00
Butter	30·00
Casein	48·20
Milk Sugar	43·90
Phosphate of Lime	2·31
,, ,, Magnesia	0·47
,, ,, iron	0·07
Chloride of potassium	1·44
,, ,, Sodium	0·24
Soda in combination with Casein	0·42
	1000·00

Such chemical examinations as these go to prove what might almost be assumed from the universality of its use, that milk is nearly perfect food. It contains a large proportion of curd and butter, which represent the musculine and fat of beef, and at the same time a large proportion of sugar, which represents the starch of wheaten bread.†

The amount of milk consumed by our large populations is very great, though it is not easy to estimate it with perfect accuracy. It is stated on authority that the monthly supply of milk from the country into London is 508,000 gallons. The western counties contribute 140,000 gallons; the eastern counties transmit 125,000 gallons; the northern counties, 95,000; Hants and Berks, 55,000 gallons; and from other districts the daily supply is augmented by 18,500 gallons. Kent and Sussex are the lowest contributing counties. At the present daily averages, 6,604,000 gallons of milk are

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[*] Annalen der Chemie und Pharmacie, xlv., 263.

[†] *Johnston's* Chemistry of Common Life, Edin., 1859, vol. 1, p. 133.

annually brought from the country to London; and this is increased by metropolitan dairymen to an extent of another third; and is daily retailed out to about 260,000 customers. The aggregate supply of milk consigned to London is the produce of 20,000 cows in the country. The value of milk brought to London for consumption represents a sum of 660,400*l.* per annum. This of course does not include a large quantity of milk produced in and about London. In Paris the aggregate consumption of milk is, with its smaller population, much greater than London.

Of the adulteration of milk, especially in London, a great deal has been written and said of late. The best authorities however, on the subject, state that though the mixture of water with milk and the abstraction of milk therefrom are beyond all question most shamefully common in the milk trade, still there is little or no admixture of foreign matter in the milk of commerce.* The addition of water, if the water be impure, may cause most serious consequences, and can never be defended, but it seems the only addition generally made.

A method of treating milk which seems to be growing in popularity is that of "condensing" it, not only for purposes of preservation, but also for immediate consumption. There are a good many Specifications of Patents connected with this subject, but as they have all been included in the series relating to "Preservation of Food" it has not been considered needful to notice then in the present series. Mr. Gail Borden has the credit of having been the first to carry out the process on an extended scale, in America, but of late several manufacturing establishments have been set on foot for the same process in this country. The process itself is not new, for several samples of "concentrated" milk were shown in the Exhibition of 1851. It is however only of late years that the manufacture has attained extensive proportions. At one factory in Switzerland 20,000 quarts are condensed daily, and of this quantity four-fifths come to the London market. It is also stated that the trade in London alone amounts to nearly 40,000 quarts daily. The process of manufacture was detailed in a paper read before the Society of Arts in May 1873 by Mr. L. P. Merriam.[*] A description is also given in a paper by Mr. X. A. Willard, of New York, which appeared in the Journal of the Royal Agricultural Society.[†]

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* "A great deal has been said and written about milk adulteration. Sheep's brains, starch, chalk, and pipe-clay, which are said—on what authority nobody has ever decided—to have been found in milk, only exist in the imagination of credulous or half-informed scientific men, who, in want of more profitable occupation, take to book-writing. It would be difficult to understand where all the sheeps' brains should come from; nor is it probable that chalk or other insoluble substances, not easily kept in suspension, should be employed in adulterating milk. I have never found myself, nor have I ever met any chemist who has found, any of the clumsy adulterations often referred to in popular treatises on food. Milk adulteration resolves itself into one of two things—either the addition of water, or the abstraction of cream; and the question which naturally arises is, can we detect to a nicety how much water has been added, or how much cream has been abstracted from a given sample. I have, perhaps, had as much experience in the examination of milk as anybody in England, and I fearlessly say that, owing to the natural variations in milk, it is utterly impossible to ascertain whether in all cases a small quantity of cream has been removed from milk, or an inconsiderable proportion of water has been added to it; and I further maintain that it is a reckless proceeding on the part of any analyst to assert that milk has been adulterated with exactly 8 per cent. of water, or with 13·75 per cent. of skimmed milk, as in one case, or with 16·25 per cent. as in another. Such assertions can only be made by young and inexperienced men."—Dr. *Voelcker's paper* above quoted.

To these papers those may be referred who desire further information on the subject. It may be sufficient to say here that the milk is evaporated down in vacuo at a uniform temperature of 160 deg. Fahr., with the addition of the best refined white sugar, until it reaches the consistency of thick syrup or honey. It takes about seven hours to condense the milk, 75 per cent. of its original bulk in water being driven off. The condensed milk thus prepared has been preserved in good condition for years. Mixed with three to four pints of water it readily dissolves, yielding a somewhat sweet fluid having a flavour of boiled milk.

In the process about 430 quarts of milk are reduced to 100 quarts of the condensed preparation. As to the actual results, Liebig gave as his analysis of condensed milk in 1867 :—

Water	22·44
Solids	77·56
	100·00

In 1871 the *Lancet* gave as its analysis :—

Moisture	25·10
Butter	11·73
Caseine	15·17
Milk-sugar	16·24
Cane-sugar	22·46
Ash	2·39
	100·00

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[*] Journal of the Society of Arts, vol. xxi., p. 450.

[†] Vol. xv. (*new series*), part 1, 1872.

Dr. Voelcker gives several analyses. Nos. 1 and 2 were made some years ago, No. 3 on a more recent production.

No. 1.

Moisture - - - - -	4·06
Fat (pure butter) - - - -	8·73
Casein - - - - -	20·25
,, (containing nitrogen) - -	(3·24)
Phosphate of lime and magnesia - -	2·34
Alkaline salts - - - -	2·48
,, (containing phosphoric acid) -	(0·26)
Sugar - - - - -	62·14
	100·00

No. 2.

Moisture - - - - -	1·78
Fat (pure butter) - - - -	16·32
Casein - - - - -	20·37
,, (containing nitrogen) - -	(3·26)
Phosphate of lime and magnesia - -	2·33
Alkaline salts - - - -	2·91
,, (containing phosphoric acid) -	(0·31)
Sugar - - - - -	5·629
	100·00

No. 3.

Water - - - - -	24·89
Fat (pure butter) - - - -	8·36
Casein (curd) - - - -	10·15
,, (containing nitrogen) - -	(1·624)
Milk and cane-sugar - - -	54·18
Mineral matter (ash) - - -	2·24
	100·00

One of the most curious preparations of milk has already been alluded to, the "koumiss" of the Tartars. This is made by producing a fermentation in the milk, the result of which is the changing of the milk sugar into alcohol and carbonic anhydride—

$$C_{24} H_{24} O_{24} = 8C_4 H_6 O_2 + 8CO_2$$

The transformation is certainly not as direct as the above *equation would imply*, for milk sugar will not yield alcohol without being first converted into grape sugar ($C_{24} H_{21} O_{21}$), a conversion which can be effected by boiling with dilute mineral acids, and is probably caused in the preparation of the koumiss by the conversion of part of the sugar into lactic acid, which acts upon the remainder of the sugar and produces the necessary change. The further breaking up of the grape sugar into alcohol and carbonic anhydride must be produced by some further action of the curd thereupon.

Without further speculation into a rather abstruse chemical question, it may be said that the process of manufacture is as follows :—New milk is set to stand with a certain mixture of ready-made koumiss for 24 hours; it is then stirred up till the curds and whey are mixed up, and again set to stand for a similar time. A further agitation completes the process and produces an intoxicating liquor from which the alcohol can be distilled out. A somewhat similar drink is, it is said, made by the Arabs, while in some parts of Ireland and the north of Scotland the buttermilk is kept till it undergoes a vinous fermentation and becomes intoxicating.*

The next part of our subject deals with the making of butter from milk. It will not be necessary here to enter into any description of the usual processes of making, or any discussion as to the important details of dairy management on which the making of good butter depends. Such matters as these have been fully treated of in the books specially devoted to farm and dairy management, and they have formed the subject of numerous papers and discussions which will be found in the Transactions of the Agricultural Societies of this and other countries. Leaving untouched this—the largest and most important branch of the subject—it may, perhaps, be possible to gather together a few facts which have not, at all events, been before presented in a collected form.

As to the antiquity of butter, there seems considerable doubt. The laborious Beckmann † has devoted some pages of his well-known work to an investigation of the subject. He decidedly arrives at the conclusion that it was not known to the classical nations of antiquity until a comparatively late period, and then only as a medicine. In the Hebrew Scriptures there are many allusions to butter,* but it seems probable that what was really meant was a preparation of sour milk—certainly a liquid that could be poured out, and not a solid like our modern butter. The earliest reference that Beckmann can find is contained in a passage of Herodotus describing some of the manners of the Scythians.† It must be admitted that the allusion is a very uncertain one, and quite as likely to refer to the manufacture of the koumiss before spoken of as to the making of butter.

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* Johnston *ut supra*, p. 307

† *History of Inventions* (Bohn's edit., 1846), vol. 1. p. 499.

The next allusion to the subject is from Hippocrates.‡ (B.C. 430), a writer of considerably later date than the "Father of History." He prescribes butter as a medicine, and refers, in terms very similar to those used by Herodotus, to the process of making it as practised by the Scythians.

The poet Anaxandrides (B.C. 376), who lived soon after Hippocrates, says that the Thracians ate butter, which the Greeks considered a remarkable sort of food. Aristotle refers to milk and cheese, but not to butter.§

Curious as it may seem that so simple an aliment should not have been known to the ancient Greeks, we must conclude that so it was, whatever knowledge they had of it, probably came to them from the barbarous Scythians or Thracians, and even when they did know of it, they only used it medicinally as an ointment.

Nor was butter known any better to the Romans. According to Strabo (d. A. D. 21) the Lusitanians and Æthiopians used butter instead of oil.[*] According to Tacitus the ancient Germans lived principally on milk and they did not make cheese, but butter.

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* The following are the references:—Gen. xviii. 8; Deut. xxxii. 14; Judges v. 25; 2 Sam. xvii. 29; Job xv. 17 Ibid. xxix. 6; Proverbs xxv. 33; Isaiah vii. 15 and 22.

† Herod. iv. 2. The historian relates that these people pour the milk into wooden vessels and agitate it, after which they skim off that which floats on the surface, which they consider the most valuable, Ἐπεὰν δὲ ἀμέλξωσι τὸ γάλα, ἐσχέαντες ἐς ξύλινα ἀγγήϊα κοῖλα . . . . . δονέουσι τὸ γάλα· καὶ τὸ μὲν αὐτοῦ ἐπιστάμενον ἀπαρύσαντες ἡγεῦνται εἶναι τιμιώτερον.

‡ De Morbis lib. iv. edit. 1595, fol. v. p. 67.

§ Hist. animal. iii. 20, p. 384, πᾶν δὲ γάλα ἔχει ἰχῶρα ὑδατώτη, ὁ. καλεῖται ὀῤῥὸς, καὶ σωματῶδες, ὁ καλεῖται τυρός. "In all milk there is a watery portion, which is called whey, and a solid part, which is called cheese." Also p. 388, ὑπαρχει δ' ἐν τῷ γάλακτι λιπαρότης, ἣ καὶ ἐν τοῖς πεπήγοσι γίνεται ἐλαιώδης. The meaning of this is not very clear. "There is in milk a fatty part which in "the solidified portions becomes oily." Such is the literal translation: Beckmann renders the last part, ἣ καὶ κ. τ. λ, "shows itself in cheese as oil;" γάλα πέπηγος is however used elsewhere for "curds," and the meaning may simply be that this fatty or greasy part of the milk is what produces the oily nature of the curd. At all events, we cannot assume from this passage that Aristotle was acquainted with the nature of butter.

Pliny speaks frequently and at considerable length about milk, and alludes several times to butter. In one place he expresses wonder that the use of butter and cheese had so long remained unknown among pastoral peoples.[†] It is, however, almost entirely as a medicine that he recommends its use, mentioning a number of ailments in which it is beneficial.[‡] He gives an account of its manufacture among the nations who use it, which may be considered as really the earliest known description of the process.[§]

Tacitus speaking of the same people, alludes to their use of "lac concretum," solidified milk, but whether this means cheese, or butter, or curd, it is not easy to say.[¶]

Dioscorides (2nd cent. A.D.) and Galen (A.D. 150), both prescribe butter as medicine, and the former proposes to use it for cooking instead of oil, thus showing tolerably conclusively that such employment of it was not known at the time.

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[*] Lib. iii. p. 233; xvii. p. 1176; xv. p. 1631. He says that elephants drank butter to make dust fall out of their bodies. In the same way Aristotle. Hist. Animal viii. 31, p. 977, says, that elephants drank oil to cure themselves. Pliny, Hist. Nat. viii. 10, p. 440, and Œlian, Hist. Animal, ii. 18, speak of the same thing. Œlian, Lib. xiii. cap. 7, says that the Indians anointed the wounds of their elephants with butter.

[†] Hist. Nat. xi. 96. Mirum barbaras gentes, qui lacti vivant, ignorare aut spernere lot sœculis casei dotum . . . . et pingue butyrum. "It is remarkable "that the use of cheese and rich butter should have remained unknown or unappreciated for so many centuries among uncivilised peoples who live on "milk."

[‡] *Hist. Nat.* xxviii. 45, 48, 51, 53, 58, 61, 74, 77.

[§] Hist. Nat. xxviii. 35. "E lacte fit et butyrum barbararum gentium lautissimus cibus, et qui divites a plebe discernat. Plurimum e bubulo et inde nomen; pinguissimum ex ovibus. Fit et ex caprino, sed hyeme, calfacto lacte; æstate expresso tantum crebro jactata in longis vasis, augusto foramine spiritum accipientibus sub ipso ore, alias præligato. Additur paululum aquæ, ut acescat. Quod est maxime coactum, in summo fluitat; id exemtum, addito sale, oxygala vocatur. Reliquum decoquunt in ollis. Ibi quod supernatat, butyrum est, oleosum natura. Quo magis virus resipit, hoc preæstantius judicatur. Pluribus compositionibus miscetur inveteratum. Natura ejus astringere, mollire, replere, purgare."

"From milk too butter is produced, a most esteemed food among uncivilised people, and one which distinguishes the wealthy from the common folk. It is generally made from cow's milk, and hence its name, but the richest is of ewe's milk. It is also made from goat's milk, but in the winter, and with warmed milk. In summer it is extracted from the milk by agitation in large vessels with a small orifice at the top to admit air, but elsewhere closed. A little water is added to make it curdle. The thickest part floats on the top, that is taken off and a little salt added. It is termed "oxygala." The rest is boiled down in pots. The part floating on the top of this is butter, a substance of an oily nature. The ranker it smells, the more it is esteemed. When old, it is used to mix in various compositions. Its effect is astringent, emollient repletive and purgative."

[¶] Virgil *Geor.* iii. 463, uses the same expression:—
"Et lac concretum cum sanguine potat equino." "And he (the Thracian) "drinks milk thickened (or perhaps curdled) with mare's milk." Columella 7, 8, 3, has "*quum lac concrevit.*"

That such a want should not have been felt is the less remarkable when we consider how little butter is even now used in Southern Europe. Oil is almost entirely employed for cooking purposes where we in England use butter. Even in France butter is not so largely employed in the kitchen as with us, where oil is hardly ever brought into requisition.

The use of butter by the ancient Germans has been above alluded to, and we conclude that from the originally pastoral peoples of Northern Europe, its use was taught to civilized nations of the South. There is some reason to suppose that the earlier forms of butter were more fluid than what we now use. It is spoken of as being burnt in lamps, and as if it was capable of being poured out.

Butter, in its ordinary condition, consists of a solid, crystallisable and easily fusible fat, a fluid oily substance, and a yellow colouring matter, besides mechanical impurities, such as casein. The oily part is a mixture of olein and a peculiar odoriferous fatty principle *butyrin*, which by saponification yields four distinct volatile acids, the *butyric*, the *caproic*, the *caprylic*, and the *capric*.* An analysis of butter by Bromus is given in Lehmann's Physiological Chemistry,† as follows :—

Margarin - - - - -	68·0
Olein - - - - -	30·0
Special butter oil - - - -	2·0
	100·0

In a paper read by Mr. T. Horsfall before the Royal Agricultural Society in 1857, some other analyses were given :—

1. Butter made in the Vosges :

	Summer.	Winter.
Solid or margarin fat - -	40·0	65·0
Liquid or olein fat - -	60·0	35·0
	100·0	100·0

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* Fowne's Manual of Chemistry (edit. 1856), p. 610.

† Vol. ii. (Leipsic edit.), p. 329.

2. Butter made by Mr. Horsfall :

Hard fat, mostly margarin, fusible at 95°	45·9
Liquid or olein	54·1
	100·

3. Butter made byMr. Alcock :

Hard fat, mostly margarin, fusible at 100°	36·0
Liquid or olein	64·0
	100·0

The two last analyses were made by Mr. G. Wilson, chemist to Price's Candle Company, and deal only with the fat of the butter, neglecting the butyrin. It is generally assumed that the excellence of butter consists in the large proportion of olein which is easily digestible. As above shown there is considerable difference in butter in the respective amounts of its two principal constituents. In practice the difference is manifested by the butter being rich and oily, or hard. The former is generally the case in summer, the latter in winter.

The average amount of butter from milk in summer is rather more than an ounce to a quart, or from 16 qts. of milk to 17 or 18 oz. of butter.

The mechanical methods which have been adopted to produce butter are many and various. Representatives of nearly all the different forms will be found in the following pages. As was before stated, the globules of fat in the milk are contained each in an albuminous envelope. When the milk is set to stand these fat globules collect on the surface as *cream*. By subjecting the cream to agitation the envelopes are broken, and the fatty matter collects into a mass of *butter*. By washing with water any traces of casein are removed. The process is thus entirely mechanical, and the only variations in it consist in the different methods by which the agitation is produced. There may be said to be two general principles on which churns act. The cream may be contained in a fixed receptacle, and agitated by a dasher or staff, or the receptacle may be capable of motion so that the cream therein contained is properly agitated. Motion may be given to the dasher in various ways, it may be worked up and down, as in the old fashioned pump churn, rotated by a winch handle, or have a compound or any other motion given to it. In the same way the churn itself may have a rotating, oscillating, reciprocating, or any other movement given to it, and may be fitted with partitions or breakers, fixed or moveable, to increase the beating and shaking effect on the milk.

In most cases churns are worked by hand. Horse-power is however occasionally used in England, and in America the power of various animals is thus utilised. A dog or even a sheep is set to turn a sort of squirrel-cage, or a dog is trained to walk on a wheel or disc set on an axis slightly inclined to the vertical and thus cause it to revolve. Numerous other devices are used to economise human labour where such labour is scarce, but for all practical purposes the churn may be considered a hand machine and nothing else.

In the report of the Juries for the 1851 Exhibition, it is stated that the pace of the churn had been first accelerated by the Americans. A series of trials was instituted, the result of which were given in the following tabular form :—

Exhibitors.	Cream.	Time.		Butter.		Residue.	Quality.	Form of Churn.	Thermometer.	
	Qts.	Min.	Sec.	lbs.	oz.				Air.	Churn.
Wilkinson	4	11	0	3	8	—	Best	Wood	—	—
Tytherleigh	10	18	0	9	2	—	Soft	Tin	70	69
Deshey	4	16	0	3	12	—	Do.	—	—	—
Ditto	9	11	0	8	12	—	Do.	—	—	—
Patrick	10	20	0	9	4	—	Do.	—	—	—
Burgess and Key	4	10	0	3	12	—	Second best	Barrel	—	—
Drummond (American)	6	9	0	5	2	—	Not made	Wood	72	71
Lavoisy	2	2	0	1	13	—	Third best	Tin	—	—
Dalphin	6	8	0	5	0	—	Soft	—	—	—
Allen	6	7	30	4	2	—	Do.	—	77	74
De Pœviquet	3	9	0	2	6	—	Do.	—	—	—
Duchene	19	9	0	7	9	—	Not all made	—	—	—
Smith	5	22	0	4	10	—	Indifferent	Centrifugal	—	—

Second trial with Jersey cream.

Exhibitors.	Cream.	Time.		Butter.		Residue.	Quality.	Form of Churn.	Thermometer.	
	Qts.	Min.	Sec.	lbs.	oz.				Air.	Churn.
Wilkinson	4	1	45	4	0½	—	Best	Wood box	72	75
Burgess and Key	4	14	5	4	2	—	Very good	Do.		
Lavoisy (French)	2	04	5	2	2	—	Third best	Tin		
Clare (French)	1	1	45	1	0½	—	Good	Do.		
Duchene (Belgian)	30	2	30	27	0	—	Second best	Barrel, wood		

It is to be noticed that in the second trials, where the time occupied in making the butter was reduced to less than a minute, the cream used had come from Jersey, and had been subjected to considerable movement in the course of transit so that it was really partly churned before the trials began.

In the Report of the Juries for the 1862 Exhibition it is said that, with the exception of a hand-press for squeezing butter dry (Hancock, No. 798, A.D. 1860), no novelty of any importance was exhibited in this class.

In the smaller Exhibition of 1872 one of the classes was devoted to food. Butter and cheese were exhibited, and some samples of the former from Australia and Tasmania were shown, but according to competent authorities the experiment of importing butter from beyond the tropics was hardly a success.

In America the "factory" system is now extensively employed. Under this arrangement the cream from a number of farms is collected at one central point where the butter is manufactured on a wholesale scale. A detailed account of this system will be found in a book on the subject by Mr. Willard, and a shorter description of it in a paper read by Mr. Jenkins, the Secretary of the Royal Agricultural Society before the Society of Arts in 1870.*

Mr. Willard's book also gives a very full account of all the various implements used in American dairies, as well as statistics and other information about the trade in milk, butter, and cheese.

As regards the entire amount of butter consumed, if we allow only 20 lbs. yearly to two thirds of the population, this would require a total supply of 200,000 tons. We import annually 62,500 tons, for which we pay nearly 7,000,000*l.* Supposing the above estimate of the total amount to be at all near the mark, we should be producing 138,000 tons at home.

In England we import large quantities of butter from France, Holland, North Germany, America, and elsewhere.

It has been calculated that on an average each person in Denmark consumes about 25 lbs. of butter a year, which as the population is estimated at two millions and a half, will give a total of about 2,600 tons. The export of butter from Denmark reaches about one-fourth of that amount. The greater part is sent to England, Hamburg, Lubeck and Norway. The average produce of a cow is from 70 to 80 lbs. of butter annually, and about 20 lbs., of cheese. The largest dairy farms are to be found in Schleswig, where 200 to 300, and sometimes as many as 400 cows, are often kept.

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* *Practical Dairy Husbandry.* By A. Willard, New York, 1872. *Journal of the Society of Arts,* vol. xix., p. 46.

The exports of butter from Holland amounted, in 1866, to 18,373,000 kilos., the largest amount in five years. In 1863, 14,506,000 kilos. were exported. The average exports from 1862 to 1866 amounted to about 16,500,000 kilos. per annum. The greater part of the butter is exported to England, and, in 1866, amounted alone to 17,173,000 kilos., against 12,500,000 kilos. in 1863.

On the marshes in Hanover, in good years a cow is reckoned to yield from 140 lbs. to 240 lbs. of butter. A good cow in Holland is to be estimated to produce 80 lbs. of butter and 180 lbs. of cheese during the six summer months. Throughout the greater part of Holland, butter is made of the cream only, and cheese of the skimmed milk, but in some districts the whole produce of the cow is devoted to making cheese. The yearly export of which is about 350,000 cwt.

Siberian butter, melted, is largely exported from southern Russia to Turkey, and the Levant, and is apparently a remunerative business. Six million pounds of Finland butter were imported into Lubeck in 1869, in consequence of the deficiency owing to the cattle disease. The quality was stated as only middling.

Ghee or clarified butter is the native butter of Hindostan, It is produced generally from the milk of buffaloes, and is universally used in native cookery. As an article of commerce ghee possesses some claims to importance. Many thousands of maunds are sent every season from some of the grazing districts to the more cultivated parts, especially to the western provinces. It is generally conveyed in "dubbahs" or bottles made of green hide.

In Chili, according to the account of a recent traveller,* butter is packed in sheepskins with the wool out, and would be very good, in spite of appearances, were it not so much salted. The operation of churning is performed by a donkey; the cream is put into large gourds or dry skins, placed on his back, and then the animal is kept trotting round the yard till the butter is churned. Some years ago, an American churn was presented to a family residing near the capital and they were taught to use it. So long as it was a novelty they were pleased, but at the end of a few weeks they decided that the donkey made butter just as well, and consequently threw it aside.

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* The author of "*Three Years in the Pacific.*"

That butter is very largely adulterated is but too certain. According to a recent writer on the subject* the process is generally effected by adding a certain quantity of water by means of sprinkling and repeated beatings when it is half solid, after having been heated to 100 degrees; by this process water can be added to the butter to the amount of 25 per cent.; 130 samples of butter bought of different merchants in the county of Kent have given the following results as regards water:—Seven samples contained from 7 to 9 per cent. of water; twenty-one, from 9 to 10 per cent.; thirty-four, from 10 to 12 per cent.; forty-two, from 14 to 17 per cent.; eighteen, 24 per cent., and nine, more than 25 per cent. Water thus plays a leading part in adulteration. It is, therefore, important in making analyses of butter to give the quantity of water when it exceeds 10 per cent. Butter is also adulterated by adding too much salt. Thus, by analysis, twelve samples furnished 52 per cent. of salt; out of twenty-seven samples two gave less than 3 per cent. of salt; two others, 3 and 4 per cent. of salt; three, from 4 to 5 per cent.; four, from 5 to 6 per cent.; ten, from 6 to 7 per cent.; two, from 7 to 8 per cent.; and one, from 8 to 9 per cent.; two arrived at 10 and 17 per cent. Above 7 per cent. the fraud commences. The usual adulteration is practised with hogs' lard, marrow, and other fatty bodies, but the mixture is never perfect, and it is easily discovered when the butter is warmed. Fats are not composed like butter, for they contain stearin, olein, margarin, &c., &c.; consequently, when it is required to discover fats in the butter, attention must be paid to the point of fusion, and to the solidification of the mixture. Butter melts at about

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* *P. L. Simmonds*, in the *Journal of Applied Science*, November 1874.

24° Cent. (75° Fahr.), and solidifies at about 17° (61° Fahr.); Kitchen grease melts at 25° (77° Fahr.), and solidifies at 18° (63° Fahr.); Marrow melts at 28° (84° Fahr.), and solidifies at 24°. (75° Fahr.). The taste also serves to discover the fraud. The flavour of butter can be recognised even when it is adulterated on a large scale. Pure butter, put on the tongue, melts rapidly, without producing any sensation of granulation; when grease has been added, it melts more slowly, and causes, at the moment of the fusion of the last parts, a sensation of granulation. The smell of kitchen grease is easily identified, but it is not the same with hogs' lard. Good butter is always of a uniform yellow, while adulterated butter is paler, and shows streaks resulting from the imperfect mixture with the grease. Butter on which one can see layers and streaks may nearly always be considered as adulterated. If a knife is passed rapidly over pure butter, a smooth surface is the result, which takes a rough appearance when there is any adulteration. At a recent meeting of the Officers of Health, it was strongly insisted that the new imitations of butter which are brought to market should be called by a special name, and that of butter should be exclusively reserved for the product obtained by beating or churning milk. It has even been proposed that those who, by changing the name or brand, try to pass off butter of margarin, or any other preparation of the same kind, for true butter, should be prosecuted.

Such artificial butters as this refers to have been manufactured in some quantity, generally from suet, &c., and it has been stated, not without respectable authority, that they are fairly suitable as a substitute for the genuine article. Near Paris there is a factory where some quantities of this preparation are made under the process of M. Mege Mourier, but at present it is certain that it has not come into any general use, at least in its genuine character. There is of course no saying to what extent such preparations have been imposed on the public.

The third and concluding portion of our subject relates to cheese. This, unlike butter, is a very ancient article of food It is mentioned by Homer,* and by very many later writers. Though the Greeks considered cheese-making (τυρποῖ) an art worthy to be made the subject of several treatises,* it does not appear that their processes differed greatly from those now in use.

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* Il. xi. 639; Od. iv. 88.

By the Romans also the art was extensively practised, but there again we do not find much that need not detain us. Cheese-making began about May.† The milk was generally unskimmed. It was slightly warmed, and the rennet (*coagulum*) was added while the milk was fresh. As soon as the curd was formed it was transferred to baskets (*ficella*, *calathi*) or wooden chests (*formæ*), perforated so as to allow the whey (*serum*) to drain off. Weights were used to hasten the process. The mass was then set in a cool place on a crate or frame, after having been salted. When partly dry pressure was again applied, and the process of salting, drying, and pressing was repeated until the cheese was complete. It was not unusual to flavour the cheese with thyme, pine cones, &c., by mixing the condiments with the warm milk.

The rennet was obtained from the stomach of the kid, lamb, or hare (*coagulum hœdinum*, *agninum*, *leporinum*). The milky juice of the fig-tree, vinegar, and other matters were also used.

The cheeses from cow's milk (*casei bubuli*) were considered most nourishing; those from ewe's milk (*casei ovilli*) more digestible, but less nourishing. Those from goats' milk (*casei caprini*) were held least nourishing, but most digestible.

Cheese, as is well known, consists principally of the casein of milk. The process of making it need not be described here. Suffice it to say that the milk, at a temperature of about 120° Fahr., is curdled by rennet, when the curd and a certain proportion of the fat separates, is strained from the whey, in which the milk-sugar still remains, and reduced by pressure to the more or less solid condition in which cheese is used. The chief differences in the various sorts of cheese are produced by the amount of cream or fatty matter left in the milk. This is shown by the following analysis of a rich Cheddar cheese when two years old, and a common one year old cheese made in Lanarkshire.‡

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* *Geoponica.* A Treatise on Agriculture compiled by Cassiannus Bassus.
† See Smith's *Dictionary of Antiquities, Art, Agriculture.*
‡ Johnston's Chemistry of Common Life, vol. i. p. 137.

	Cheddar.	Skim Milk.
Water - - -	36·00	44·00
Curd - - - -	29·00	45·00
Fat - - - -	30·50	6·00
Ash - - - -	4·50	5·00
	100·00	100·0

There is of course far greater variety in cheese than in butter, as cheeses vary from the pure cream cheeses made of cream only, which must be eaten fresh and will not keep, down to the skim-milk cheeses such as the above, which contain only a small proportion of fatty matter at all.

When cream is added to new milk, generally the cream of the evening to the milk of the following morning, a rich cheese, such as the English Stilton or the French Brie, is made. From good new milk Cheddar, Wiltshire, double Gloucester, and such like cheeses are produced. Cheshire cheese is made of milk with a small part of the cream removed. Single Gloucester from milk mixed with the skim-milk of the previous day. Cheeses from skim-milk vary according to the number of skimmings; such are Dutch, Leyden, and Suffolk cheeses.

Besides the differences caused by varying amounts of cream are those produced by special methods of manufacture, by mixing cow's and goat's milk, &c. The French have a great many different sorts. The cheese manufactured in the old province of Bresse, now the department of the Ain, is made by boiling the milk, adding a little saffron, taking it off the fire, and putting it in the rennet immediately. The curd is then dried in a cloth, pressed for a few hours, put into a cellar, and salted five or six days after, this latter operation being continued for a month. Auvergne or Cantal cheese is made without boiling the milk, but curdling it while fresh from the cow; the whey being then separated, a man, with his legs bare up to the thighs, gets upon the table on which the curds have been put in a tub pierced with holes, and kneads the paste thoroughly with his arms and legs; an operation which lasts about an hour and a half. The uniform mass thus obtained is left to ferment for forty-eight hours, and then salted, put into moulds, and pressed for twenty-four hours; after which the cheeses are put into a cellar, frequently looked after, and rubbed with a cloth dipped in fresh water. The celebrated Roquefort cheese, made in the village of that name in the Aveyron, is obtained with a mixture of sheep's and goat's milk; but even in the milking there is a secret, for when the udder appears to yield no more, the maid strikes it repeatedly with the back of her hand, whereby a little more milk is obtained, much richer in butter.* This operation, which is quite harmless, causes the udders to increase in size in course of time. The next reason assigned for the peculiar flavour of Roquefort cheese is, that when made into cakes it is kept in caverns hollowed out in a calcareous kind of rock which skirts the village: the temperature of these recesses is kept low by various contrivances, and seldom rises above five deg. Cent. (41·Fahr.). The cheese is made with the milk of the morning and of the evening before. The other manipulations present no peculiarity; but as for the veins, or *persille*, as they are called, they are obtained by mixing crumbs of mouldy bread with the curds. The quantity of this cheese annually supplied to the trade is 900,000 kilogr. Fromage de Brie is chiefly manufactured in the departments of the Seine-et-Oise and Seine-et-Marne, to the amount of 2,500,000 kilogr. per annum. Rennet is put into milk while warm from the udder; the curds are made into cakes, and laid on wicker trays, so that the whey may run off. After twenty-four hours they are salted, and then turned and shifted from time to time for the space of a fortnight or three weeks. Parmesan cheese is said to owe its flavour from the fine pasturage of the meadows of the country of its production.

The usual Dutch cheese is made of the skimmed milk. But there are finer kinds made for home consumption, with also a portion of the cream left in the milk. The most highly prized in that land is the "schapekase" or ewes' milk cheese, what sells at a higher price.

The exports of Dutch cheese, during the year 1866, amounted to 30,339,000 kilos.; an increase of 2,180,000 kilos. on those of 1864 and 62. The average annual exports of this branch of industry, from 1862 to 1866, were 28,500,000 kilos. In 1866 two-thirds of this article was exported to England, and a great part of this is re-exported by the English merchants to the colonies, the Mediterranean and Gibraltar. The exports to France during the same year amounted to 4,500,000 kilos.

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* Hesiod Operæ et dies 590 *γάλα τ'αἰγῶν σβεννυμενάων.* "Milk from goats "drained nearly dry."

Gonda cheese, the best sort made in Holland, owes its peculiar pungency to the muriatic acid used, instead of rennet for curdling the milk.

Swiss cheese is usually made from skim milk, and flavoured with herbs. There are of course richer cheeses such as the Neufchatel and Bondon, of the nature of cream cheese.

In Westphalia cheese the curd is allowed to become slightly soured before it is compressed. The Italian cheese which is prepared for exportation is kept in brine, and is consequently excessively salt. It is only intended as a condiment for macaroni. A species of flat round cheese made at Gallipoli is much esteemed in Turkey, Egypt, and Greece, and large quantities are annually exported. Australia at present imports cheese from America, but in time to come it is very probable that a large quantity of cheese may be made there for export as well as for home consumption. The amount of cheese consumed in England is very large, and has been estimated at 10 lbs. a head of the population. The average imports are 55,000 tons and the estimated amount made at home 100,000 tons. In America the production of cheese is very large and increasing.—It is stated that, under the factory system, which is largely applied to cheese, as well as butter, the cheese product of the United States rose from 105,000,000 lbs., in 1860, to 240,000,000 lbs., in 1868; while the demand in the latter year exceeded the supply by 72,000,000 lbs. The entire dairy product of the United States in 1868, it is estimated, was worth 400,000,000 dollars (£80,000,000). There were then 792 factories, 660 of them in the State of New York. In the two following years, 200 new factories were started in that State, and 54 in Wisconsin.

The export of American cheese to Great Britain in 1870 amounted to 57,000,000 lbs. valued at 8,000,000 dollars. (£1,600,000).

The following is a similar Table, showing the Trade amongst the British Colonies and Possessions, compiled from the same source.

TRADE in BUTTER and CHEESE in BRITISH COLONIES and POSSESSIONS.

NAME OF COUNTRY.	ARTICLES.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.
VICTORIA—IMPORTS -	Butter and Cheese. *Tons*	2,962	4,471	4,849	3,180	1,329	1,975	1,103	823
	£	398,861	595,879	531,116	301,215	154,176	243,236	116,742	111,511
NATAL—EXPORTS -	Butter - *Cwts.*	3,000	3,699	3,708	2,538	2,334	1,887	1,694	745
	£	15,685	17,610	19,306	14,582	11,381	8,204	5,650	3,395
CANADA—EXPORTS -	Butter - *Cwts.*	33,225	33,484	49,218	64,960	79,514	62,981	64,511	61,973
	£	98,776	108,133	162,867	172,940	232,761	195,322	210,841	270,883
	Cheese - *Cwts.*	117	323	1,110	2,628	4,390	8,562	1,138	7,442
	£	312	972	3,375	4,987	10,255	16,707	2,468	900
NOVA SCOTIA—EXPORTS.	Butter - *Lbs.*	—	—	—	—	—	—	—	—
	£	—	—	—	—	—	—	—	—
NEWFOUNDLAND—IMPORTS.	Butter - *Cwts.*	20,678	21,304	19,895	20,873	15,264	19,400	16,536	18,365
	£	59,993	63,164	58,615	62,064	44,463	58,358	50,900	65,522
JAMAICA—IMPORTS -	Butter - *Cwts.*	5,378	5,663	5,995	5,957	6,770	6,029	4,701	4,043
	£	5,919	21,529	27,236	24,740	32,660	21,451	20,961	16,959
BARBADOES—IMPORTS.	Butter - *Lbs.*	895,678	768,376	929,109	859,566	736,496	762,044	861,011	894,066
	£	39,284	38,420	46,456	42,978	36,824	38,102	43,050	44,703
BRITISH GUIANA—IMPORTS.	Butter - *Lbs.*	—	563,380	627,134	600,463	565,625	589,916	610,506	543,054
	£	—	21,883	27,376	25,163	28,690	23,667	25,009	21,586

Trade in Butter and Cheese in British Colonies and Possessions—*cont.*

NAME OF COUNTRY.	ARTICLES.		1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.
VICTORIA—IMPORTS -	Butter and Cheese.	*Tons* £	963 166,358	587 64,286	477 48,631	855 100,756	722 67,805	182 14,870	77 6,855	— —
NATAL—EXPORTS -	Butter -	*Cwts.* £	2,160 11,114	1,855 8,056	1,967 6,842	2,369 8,503	2,321 7,298	1,477 4,719	916 5,178	— —
CANADA—EXPORTS -	Butter -	*Cwts.* £	93,293 436,306	96,589 362,769	88,897 330,776	90,541 457,356	105,738 467,080	131,219 607,414	162,228 717,234	129,150 557,539
	Cheese -	*Cwts.* £	8,703 05,728	14,081 40,324	54,567 128,738	40,126 114,332	51,921 140,153	73,458 231,114	146,858 381,289	173,801 474,697
NOVA SCOTIA — EXPORTS.	Butter -	*Lbs.* £	— —	664,615 21,191	704,082 30,230	406,220 22,675	710,957 29,738	881,370 33,483	726,137 26,971	— —
NEWFOUNDLAND—IMPORTS.	Butter -	*Cwts.* £	15,530 59,444	12,930 39,754	8,664 27,074	12,858 40,182	16,574 51,796	15,335 45,841	16,926 52,893	— —
JAMAICA—IMPORTS -	Butter -	*Cwts.* £	4,879 22,951	3,093 13,004	3,051 13,161	3,539 16,748	3,225 16,925	3,877 32,649	4,687 35,005	— —
BARBADOES — IMPORTS.	Butter -	*Lbs.* £	826,150 41,308	854,492 42,725	845,476 42,274	639,477 31,974	617,215 30,861	806,287 40,314	562,212 28,111	— —
BRITISH GUIANA—IMPORTS.	Butter -	*Lbs.* £	651,105 28,639	625,513 23,525	458,871 17,270	552,168 23,632	491,618 26,185	614,547 33,126	754,068 32,903	— —

MILKING, CHURNING, AND CHEESE-MAKING.

MILKING, CHURNING, AND CHEESE MAKING.

A.D. 1777, August 8.—Nº 1166.

RASTRICK, John.—"Barrel churns."

"The basis is a single or double cask or vessell, either
" hanging, horizontal, standing, perpendicular, or inclining,
" put upon or without frame. The barrel may be of timber,
" tin, or metal, so that the breakers or internal works turn
" round within by a handle without, put upon the end of an
" iron axis or worked by a wheel and pinion. The iron axis
" passes through a coller on the end of the barrel, from thence
" through a wooden axis into another coller or footstep. The
" iron axis has a stop to prevent the cream from running out
" at the celler. The stop is an iron ring, fixt on the iron axis,
" running against the end of the barrel or otherwise. The
" stopper may be made of any other metal or leather. The
" wooden axis is divided into three divisions, more or less,
" according to the size of the barrel; and in each division
" there are arms or spoaks fixt into the wooden axis for
" breakers, with a rail put upon the ends of each sett of
" breakers. The rail may be either solid, holed through, or
" indented on the edge. The coller is an iron socket with a
" plate fixed on the end of the barrel. These collers may be
" made of metal or wood, and generally hangs upon a frame,
" so that the barrel can be turned round independant of the
" breakers or internal works, or fixed fast at pleasure. There
" is a ventilator put upon the side or end of the barrel to con-
" vey in the sweet air, and extract the acid from the cream.
" The said ventilator is a box of wood with a partition in the
" same with an angler peace at the bottom for receiving and
" discharging the air. It may be worked with valves, or con-
" veyed with pipes from or into the barrel at different places.

" The ends of the barrel may either be made fast or to take " out occasionally with screws."

[Printed, 4*d*. No Drawings.]

A.D. 1792, July 28.—N° 1904.

MARCH, RICHARD.—" Improvement upon the butter churn, " for the more expeditious making of butter, and preventing " its becoming rancid or oily in the process."

[No Specification enrolled.]

A.D. 1792, October 18.—N° 1911.

MARCH, RICHARD.—" Improvement upon the butter churn " for the more expeditious making of butter, and preventing " its becoming rancid or oily."

A vertical spindle revolves freely in a board forming the top of the churn, and secured from rotating by pieces fitting in notches on the sides of the churn. This spindle is turned by a handle at top, and is supported by four arms fixed on it and terminating in castors which run on the top of the churn. To the part of the spindle within the churn are fixed four dashers of perforated board. As the whole apparatus is supported by the top of the churn, there is no friction between any parts of it, by rubbing between which the butter may be affected.

[Printed, 6*d*. Drawing. See Rolls Chapel Reports, 6th Report, p. 145.]

A.D. 1796, November 10.—N° 2146.

RALEY, WILLIAM.—" Horizontal turning churn."

A cylindrical barrel is mounted on a pivot in the centre of its lower end. There is also a fixed shaft passing down into it from above and bearing against the inside of its bottom. On these pivots the barrel is capable of free revolution. Round its upper edge is a circle of cogs, into which the teeth of a cog-wheel with a horizontal axis take. By rotating this wheel by means of a winch, the barrel can be rotated. Fixed round the inside of the barrel are shafts carrying small dashers having alternate spaces between them. These are carried round with the barrel. On the before-mentioned central shaft are other similar dashers, alternating with the first set. These remain stationary. By the action of these two sets of dashers one set revolving round the other fixed central set, the churning is *effected*. The entire apparatus is mounted in a suitable frame.

[*Printed, 1s*. Drawing. See Repertory of Arts, vol. 7, p. 289.]

A.D. 1804, March 23.—N° 2754.

ROWNTREE, Thomas. — "Machine on an improved construction for agitating and separating certain mixtures."

The apparatus is intended to be used for churning. Two cylinders are fitted together with their axes forming a slight angle. Their outer ends are furnished with caps from each of which a rod passes along the centre of the cylinder. On this rod are perforated discs. This apparatus is mounted on trunnions at its centre, and has a lever handle attached to it by which an oscillatory movement can be given to it. By this means cream within the cylinder is driven from end to end thereof against the perforated discs and so converted into butter.

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 5 (*second series*), p. 11.]

A.D. 1807, May 9.—N° 3040.

WOODS, James.—"Machine for churning."

A lever is pivotted at one end to a strong framework resting on the ground at a suitable height. At the other end is a rope and handle by which it can be drawn down. Its upward motion is effected by means of a second lever, one end of which fitted with a roller bears against the under side of the first lever, while its other end is depressed by a weight. An up-and-down motion is thus given to the lever and this is used to work the staff of the dasher of a churn. The apparatus may also be used for pumping, &c.

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 2 (*second series*), p. 95; Rolls Chapel Reports, 7th Report, p. 104.]

A.D. 1814, November 10.—N° 3851.

HOWARD, William.—"Gear for working the pumps on "board ships, which may also be applied to churning and "various other useful purposes on shore."

No description is given of the manner of the application of the invention, but from the drawings it appears as if it were intended to give a reciprocating vertical motion to the staves of the dashers of two churns at once. A fly-wheel turned by a handle imparts motion by a pair of bevel wheels to a horizontal shaft at right angles to its axis, supported by a pair of uprights. On each end of this shaft is a crank to which a connecting rod from the churn-staff is attached.

[*Printed, 10d.* Drawing. See Repertory of Arts, vol. 27 (second series), *pp. 103, 206.*]

A.D. 1836, March 26.—N° 7045.

BLURTON, William.—"Apparatus for extracting milk from "cows."

A small tube is inserted into each teat so as to keep the muscles distended and allow the milk to flow. The tube may be simply rounded at the top and pierced with small holes, or preferably in addition to this there may be a small vessel attached to the bottom to receive the milk and discharge it again, always retaining such a quantity that the level of the milk in the vessel may be above the bottom of the tube. The object of this is to prevent air passing into the udder after it has been emptied of milk. The vessel may be of any suitable shape, cylindrical, globular, or other, or it may be formed by bending up the tube or attaching another short length of tube at an angle. The milk pail may be slung over the cow's haunches.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 9 (*conjoined series*), p. 93; Mechanics' Magazine, vol. 29, p. 6; Rolls Chapel Reports, 7th Report, p. 173.]

A.D. 1842, May 17.—N° 9350.

WILLIAMS, Thomas.—Churn.

Three sorts of churns are described.

1. A central spindle is actuated by gearing on the top of a barrel-shaped vessel. This spindle has attached to it vanes, and there are fixed breakers on the sides of the vessel. Also the vanes may be made in two sets one above the other, with a fixed division between across the churn.

2. An oblong box has a square dasher hung about its middle point from a bar across mounted in bearings; on one end of this bar is a heavy pendulum which hangs outside the box. This is swung backwards and forwards by means of a cord, and carries the dasher with it.

3. An archimedean screw is used by which the cream is drawn up and poured on to a perforated plate which allows the buttermilk, &c., to run through, and retains the butter.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 20; Record of Patent Inventions, vol. 1, p. 285.]

A.D. 1843, July 6.—N° 9825.

MASTERS, Thomas.—"Freezing, cooling, churning, and ice-"*preserving* apparatus."

A receptacle standing on suitable supports is divided horizontally by a partition. In the upper division two vessels are placed, each surrounded by an outer vessel so that a space is left for holding freezing mixture or hot or cold water. The outer vessels are fitted with taps for the discharge of the water. In each interior vessel is a "spatula," preferably with three blades, mounted on a pivot in the bottom, and secured by a pin above in one of several holes intended to set the spatula at any required height. A stud on the bottom of the vessel outside fits on the end of a shaft which passes down into the lower partition and there is fitted with a pulley. The pulleys on the two shafts corresponding to the two vessels are connected by an endless band, and one of the shafts is driven through bevel gearing from a winch handle outside. A tightening pulley is used to keep proper tension on the band. Any number of vessels similarly arranged may be employed.

Instead of the above arrangement, an inner and outer vessel as above may be set in a suitable casing, and a handle may be mounted on the top of the spatula shaft so that it can be rotated. Also the spatula can be secured by a pin, and the vessel attached to the handle so that it is rotated and the spatula held stationary.

Two other varieties of spatulas or dashers are described. In one a pair of flat boards is connected by a cross piece at top. Two of these are joined, so that a four-bladed dasher is formed. This is fixed on a central spindle which passes down into a tube rising from the bottom of the vessel and is driven by gearing below. In the other a perforated flat board has a pivot at bottom and a stem above by which it is rotated.

Various other improvements connected with freezing and cooling are described.

[Printed, 1*s*. 2*d*. Drawings. See Mechanics' Magazine, vol. 40, p. 81.]

A.D. 1847, May 29.—Nº 11,726.

BEKAERT, Francis Bernard.—"Increasing the quantity of "cream produced from milk and preserving milk."

A mixture is made consisting of 1 quart water, 1 oz. carbonate of soda, "one tea-spoonful of a solution of turmeric or "curcuma," and "three drops of marigold water." The two latter ingredients are added after the soda and water have been mixed. Instead of weighing the soda, it may be added in such proportions as to raise the mixture to a density of ten degrees of a certain "salometer" "which in Belgium is known " by the denomination of a 'pése sel.'" A "good table " spoonful" of this liquid is added to a pan of milk, and the skimming effected as usual. Any other alkali may be used, and the soda and water without the other ingredients may be employed.

A method of preserving milk by the use of this liquid is also described.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 2 (*enlarged series*), p. 43; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 41.]

A.D. 1849, June 7.—Nº 12,647.

ANTHONY, Charles James. — "Treating unctious animal " matter."

A rotary churn is described with dashers composed of a board or frame pivotted on a spindle across its breadth and turned by a handle outside the churn in the usual manner. This board is divided into cells or chambers by ribs of wood, running parallel with the spindle. Round its edge is also a wooden rim. Two of these may be set on the same spindle at right angles to one another, or one alone may be used.

There may be modifications in the shape of the dasher. The cells may be set on each wing of it on one side only, and open in the direction of its rotation; other modifications may also be employed.

The claim is for forming a dasher with cavities of any sort therein.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 21; Mechanics' Magazine, vol. 51, p. 572; Practical Mechanics' Journal, vol. 3, p. 160; and Patent Journal, vol. 8, p. 152.]

A.D. 1851, January 16.—Nº 13,458.

COGAN, Robert.—"Applications of glass.

Among other applications is one for a churn. This consists of a cylindrical glass vessel mounted on a wooden stand. In the centre of the bottom is a projecting point, on which the lower end of a vertical spindle revolves. The upper part of the spindle has its bearings in a wooden cover fitted to the vessel. Perforated dashers are fixed to the spindle, which is driven by a winch through a pair of cog-wheels on the top of *the cover.* A frame is fixed inside the vessel which carries on it "stationary dashers" or fixed vertical bars against which the cream is thrown by the rotation of the revolving dashers.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 34; Mechanics' Magazine, vol. 55, p. 77; and Patent Journal, vol. 2, p. 197.]

A.D. 1851, February 10.—N° 13,498.

NEWTON, William Edward. — (*A communication.*) — "Milking animals."

A bag of gutta percha, &c., is made to fit over the teat of the animal, and is held tight thereon by an elastic band near the upper edge of the bag. A small metal tube of a non-oxidisible metal is fixed to the bag so that it may enter the teat. This tube is plugged by a piston of metal or gutta percha which is withdrawn when the apparatus is in position, and the milk is discharged through the tube.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 173; Mechanics' Magazine, vol. 55, p. 138; and Patent Journal, vol. 2, p. 266.]

A.D. 1851, June 24.—N° 13,674.

HODGES, Richard Edward, and BROCKEDON, William. —"Surgical instruments."

Among the inventions described is an apparatus for milking cows. A shield of gutta percha is made to fit on the udder, in which are apertures to receive the teats. This is connected to an air-tight vessel, either by the shield itself forming the cover of the vessel, or by having connecting pipes. In the former case a band over the cow's back supports the vessel against the udder. By working an air-pump attached to the vessel a partial vacuum is created and the milk drawn out.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 19 (*enlarged series*), p. 215; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 106; Mechanics' Magazine, vol. 56, p. 17.]

A.D. 1851, July 29.—N° 13,701.

DRUMMOND, Peter Robert.—Churn.

The churn consists of a vessel divided down the centre into two chambers by a perforated vertical partition which slides in grooves so as to be moveable. In each compartment is a plunger worked by a rod passing through the cover of the churn. This rod is hollow, and has over its lower end a valve opening downwards so as to fall as the plunger rises, and be closed as it ascends by the pressure of the liquid. Above the cover, there is an aperture in the side of the hollow rod, fitted with a valve opening in the same direction as the former one. This arrangement is intended to drive air into the fluid every time the plunger rises. The two rods are worked by a wheel between them, to the circumference of which a cord from either rod is fixed. An alternating motion being given this wheel by means of a crank driven from a fly-wheel, an up-and-down movement is communicated to each rod alternately.

[Printed, 8*d.* Drawing. See Repertory of Arts, vol. 19 (*enlarged series*), p. 141; Mechanics Magazine, vol. 56, p. 118.]

A.D. 1851, October 17.—N° 13,779.

ROBERTS, Richard.—Regulating, measuring, agitating, and otherwise treating fluids.

There are twelve applications of the invention, among which is one for a churn.

A circular vessel is mounted on a central vertical spindle so as to revolve thereon. It has a deeply recessed bottom so as to afford room for gearing by which it can be revolved. On the top of the spindle are arms carrying "splashers" or wings. As the vessel is caused to revolve, the milk or other liquid contained therein is driven outwards by centrifugal force and against the "splashers."

[Printed, 3*s.* Drawings. See Mechanics' Magazine, vol. 56, p. 338; Engineers' and Architects' Journal, vol. 15, p. 262.]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, November 5.—N° 641.

HALL, Collinson.—"Apparatus to be used in the carriage "of solid and liquid bodies."

The apparatus described consists "in a revolver or carriage "*formed by two large* rims, discs, or wheel, united as closely

" as possible by a central axis or gudgeon" to which shafts or other appliances for traction are attached. " The inner " circular surfaces" of the wheels "are connected by several " rods or bands of metal, gutta percha, or other material; and " the outer circular surfaces are fitted to bags or other re- " ceptacles" for carrying liquid matters. It is stated that a " revolver churn is furnished with beaters turned by the " motion of the drum, and can be worked by a donkey or " a poney." No further description is given of the way in which it is to be used.

[Printed, 8*d*. Drawing.]

1853.

A.D. 1853, February 3.—N° 298.

GREENHALGH, JAMES.—(*Provisional protection only.*)— Churns.

The invention relates to a method of communicating motion to an "ordinary reciprocating churn staff," one or more.

The staves are connected by bands to the periphery of a disc to which an alternate motion is given so as to communicate a reciprocating vertical movement to the staff or staves. The disc is driven from a crank, the shaft of which is immediately below the centre of the disc, the connecting rod being attached to a point on the disc on the same side of the centre. The revolution of the crank thus imparts the required movement to the disc. There may be a hole cut in the disc through which the crank-pin may pass, or portions of the disc may be cut away so that it forms a pair of segmental levers. Or the crank-pin may work in a slot in the disc, so as to produce the same result. Instead of bands on the edge of the disc, other means of imparting motion to the staves may be employed, as toothed wheels, &c.

[Printed, 6*d*. Drawing.]

A.D. 1853, February 4.—N° 314.

WOODWARD, ALFRED.—(*Provisional protection only.*)— " Double action vertical lever churn."

The entire Provisional Specification runs as follows:—" My " improvements in churns consist in working two or more

" beaters vertical and with a reciprocating motion; the vessel
" holding the cream being divided into as many divisions as
" there are beaters, the said divisions being perforated from
" top to bottom in order that the atmospheric air may be
" freely mixed with the cream in the process of conversion
" into butter, as also forcing the cream from one compartment
" into another, rendering the churn equally available for a
" small as a large quantity."

[Printed, 4*d*. No Drawings.]

A.D. 1853, February 23.—N° 461.

WILLARD, ASA.—" Machines for manufacturing butter, to " be called 'A. Willard's butter machine.' "

The receptacle for the cream is cylindrical at bottom, and is fitted with an outer jacket to receive warm or cold water. The revolving dasher within is of peculiar construction. It has a horizontal axis; the head at each end is formed of a pair of cross-pieces, fixed so as to form a X, not at right angles. The heads carry between them a pair of fluted rollers, and a pair of plates of curved form, so that when the dasher is turned in one direction it drives the cream towards the centre, and when turned in the other, it spreads and smooths the butter. On the same arms which carry the plates, other smaller plates are hinged at a point nearer the centre, so that they may either open or close. The dasher is rotated in the usual way by a handle. The construction of the whole is such that it requires a figure to make it properly intelligible.

[Printed, 10*d*. Drawing.]

A.D. 1853, March 9.—N° 600.

NASH, THEOPHILUS JOHN.—Churns.

The object of the invention is to give "an up-and-down and " rotatory motion to the spindle and dasher of churns." A toothed wheel on a horizontal axle is driven from a winch handle. This drives a second toothed wheel above it. On the spindle of each of these wheels is an excentric. On the staff carrying the dasher is a disc which is held between the peripheries of the two excentrics, and is by their action carried up and down, a rotatory motion being at the same time given to the disc and the staff. The dasher as figured consists of one or more perforated discs.

[Printed, 8d. Drawings.]

A.D. 1853, May 4.—Nº 1089.

MASTERS, Thomas.—"Apparatus for freezing, cooling, and "churning."

The apparatus described are freezing machines, but are also available for churning. An outer vessel of non-conducting material contains liquid to be cooled, and within this is a second vessel containing ice or freezing mixture; or this second vessel may be dispensed with and the freezing material placed within the first vessel. Within the vessel containing the freezing material is a vessel in which is placed the matter to be treated; this vessel is formed with a hollow interior cone passing up into it from the bottom, so as to allow the cold to be applied to the central portion of the mass. Through the centre of this vessel a vertical spindle passes which carries an agitator working in the freezing material below the central vessel, and two others working in the vessel among the matter under treatment. This spindle is turned by a handle at top. When several of these apparatus work together, the lower agitators may consist of cog-wheels, and one spindle may drive the others. Also the spindle may be fixed, and the vessel rotated by a handle fixed thereto.

When the apparatus [is used for churning, warm water is placed in the outer vessel and the cream in the inner one.

[Printed, 10*d*. Drawing.]

A.D. 1853, June 20.—Nº 1509.

CORNELIUS, Richard.—Churn.

The object of the invention is to cause a stream of hot or cold water as required to pass along tubes through the churn.

The churn consists of a cylindrical vessel fixed with its axis horizontal in a cistern containing water. The beater is of metal and hollow, preferably "of a bent tube, with the alter- "nate spaces" "stopped with metal," &c. On the spindle "of the beater is a "wheel of a sort of volute interior" so that it may take up water from the cistern and transmit it to the tubes of the beater, along which it flows, to run out of an opening at the opposite end of the spindle.

[Printed, 6*d*. Drawing.]

A.D. 1853, July 21.—Nº 1728.

COCKEY, Edward, COCKEY, Henry, and COCKEY, Francis Christopher.—"Production of cheese."

Heat is applied to the milk in the process of cheese-making by means of a metal. cheese-tub with a double bottom, or having a coil of tubing laid on its bottom, to which hot water or steam is admitted. Cold water may be used in a similar way.

[Printed, 6*d*. Drawing.]

A.D. 1853, September 28.—N° 2226.

ASKIE, THOMAS.—(*Provisional protection only.*)—Churn.

"This invention consists of a peculiar construction or " arrangement of gearing whereby a rotary as well as a reci" procating or up-and-down motion may be simultaneously " communicated to the agitator, stirrer, or beater of a churn " or other agitating or stirring apparatus. This object is " effected by means of two bevil or mitre wheels, one of which " is mounted on an axle or shaft which carries a fly wheel or " winch handle, and, by means of a connecting rod, communi" cates motion to the vertical shaft of the agitator or stirrer. " The connecting or crank rod is joined to the vertical shaft by " means of a ring, in which the shaft is free to turn horizon" tally. The shaft passes freely through the hub of the " second and horizontal mitre wheel, and is furnished with a " feather which works up and down in a groove made in the " hub of the bevil wheel."

[Printed, 4*d*. No Drawings.]

1854.

A.D. 1854, March 3.—N° 518.

TINDALL, LORENZO.—Churn.

The invention relates to "rotatory churns of the ordinary " 'barrel' kind, and consists in setting the barrel" "diagon" ally as regards the spindles, so that the axis of revolution " makes an angle with that of the barrel." "In other re" spects the churn is constructed as at present," and consists of a barrel mounted excentrically in suitable supports, with a handle on the spindle at one end by which it is rotated, and a fly-wheel at the other end to equalise the motion.

[Printed, 6d. Drawing.]

A.D. 1854, September 29.—N° 2093.

MOHAN, Thomas.—Churn.

The dasher consists of a vertical spindle on which is fixed a series of fans. These "form part of a spiral thread, a portion " of the thread equal in size to one of the fans" "being cut " away between each fan." The spindle is revolved by an endless band working on a boss near its top or otherwise. It works in a suitable bearing at bottom. The churn is preferably oval in shape at top and bottom.

[Printed, 8*d*. Drawing.]

A.D. 1854, December 7.—N° 2567.

HODGSON, Christopher, and STEAD, James Whitley.—Cleansing fabrics and churning.

When the invention is applied to churns, a cross-head is fixed on the top of an ordinary churn-staff. To each end of this cross-head is attached a connecting rod from one of two opposite cranks on a crank-shaft driven from a winch handle. One of these rods is "jointed, so as to lift" the staff and dasher, the other has "a joint near the block (or cross-head) " turning vertically" and serves to give a "twisting curvi- " linear motion" to the staff. The crank-shaft as figured is situated beside and on a level with the cross-head. It is stated that the motion produced is "exactly the same as is " given when worked by hand."

[Printed, 6*d*. Drawing.]

1855.

A.D. 1855, June 21.—N° 1425.

KEEVIL, Richard.—"Vessels used in the manufacture of " of cheese."

The invention consists in fitting strainers to such vessels. A vertical opening is made down the side of the vessel, and this is fitted with a sliding plate of wire gauze. It may be closed by a solid sliding plate. Outside it is a receptacle of corresponding shape to receive the whey which is discharged through a tap at the bottom. The vessel is fitted with a bar across the top in which a spindle may be mounted carrying a frame fitted with cutters arranged vertically on one side of the spindle, horizontally on the other. The same bar serves for the screw of a presser-plate to work in. In the top of this plate are openings fitted with wire strainers, and there is a channel cut in it to conduct the whey to the receptacle above mentioned. The vessel is preferably of metal and cylindrical. It is fixed on a stand mounted on trunnions so that it can be tilted.

[Printed, 6*d*. Drawing.]

A.D. 1855, July 12.—N° 1557.

GREENING, Benjamin.—Machinery for washing, &c., partly applicable to churning.

The part of the improvements applicable to churns consists in a method of imparting a combined rotary and reciprocating vertical motion to the dasher. A three-armed lever is pivotted at the junction of its arms. One of its arms is pointed vertically downwards; the two others are horizontal. Motion is imparted to one of the horizontal arms from a crank, and the opposite arm is connected to the dasher staff which consequently receives an up-and-down motion. The third arm engages in the links of an endless chain passing round a fixed pulley on the staff, so that an alternate rotary motion is given thereto.

[Printed, 10*d*. Drawing.]

A.D. 1855, July 19.—N° 1630.

FERRYMAN, Edward Augustus.—Churn.

The dasher has a rocking motion. The ends of the churn are of a triangular shape. The dasher is a perforated board between two side pieces fixed to a cross-piece set in bearings at the top of the churn. This receives a rocking motion from a handle across it. Above the dasher in the churn is a splash board which leaves room at each end for the side pieces of the dasher to work. Part of one of the larger sides of the churn is made to let down on hinges, to give access to the inside. A tap is provided for drawing off the butter-milk, and the whole apparatus is mounted on a suitable stand.

[Printed, 6d. Drawing.]

A.D. 1855, September 22.—N° 2125.

POLLITT, William, and EASTWOOD, James.—"Churning "milk and mixing liquid compounds."

The inventors say :—"We use a vessel of any convenient "shape, and on it place a driving shaft in any desired position, "supported by suitable bearings in which it can revolve; on "the shaft we fix one or more bevil or spur wheels, which "work in one or more bevil or spur wheels fixed outside the "vessel, but at the extremity of shafts or spindles placed "inside the vessel. On each of these shafts we fix frames "with beaters composed of wood or metal, so that as the said "driving shaft is turned by a handle or other means, the "shafts and beaters inside the vessel revolve in opposite "directions by means of the bevil or spur wheels aforesaid, "thus giving a compound action to the beaters and an agitated "motion to the milk or liquid. The rods or beaters can "either be placed parallel to or at right angles to the shafts "and spindles inside the vessel." The beaters as figured are composed of bars alternating on each shaft, so as to pass between each other.

[Printed, 8*d*. Drawing.]

A.D. 1855, October 24.—N° 2384.

FONTAINEMOREAU, Peter Armand le Comte de. — (*A communication.*)—(*Provisional protection only.*)—Churn.

The churn consists of a cylindrical vessel of "tin or tinned "iron" placed within another cylindrical vessel to hold hot or cold water. Round the circumference of the inner cylinder are fixed partitions parallel with the axis, formed of perforated metal. In the centre of the vessel a hollow spindle works. This is fitted with wings or beaters, perforated like the partitions, and below it is "a turbine or centrifugal bellows" "the small compartments" of which "communicate with the "interior" of the spindle. The spindle is driven by gearing. No further explanation is given of the action of the apparatus. A figure is shewn "of the apparatus for receiving and "decanting the milk," but no description of this is given, except that it is "provided with a table with a rim."

[Printed, 6*d*. Drawing.]

1856.

A.D. 1856, February 26.—N° 491.

CORNES, John.—" Machines for washing and churning."

The dashers are formed of hollow vessels with perforated sides. They are somewhat of prismatic shape, and are fixed along one edge to a spindle set horizontally in a suitable vessel. They are preferably set opposite one another in pairs to balance one another. Each vessel is fitted on its outer side with a small hinged flap secured by a catch. The spindle is rotated by a winch handle outside.

The same apparatus is used for washing and churning. For washing the articles to be treated are placed in the rotating vessels.

[Printed, 6*d*. Drawing.]

A.D. 1856, March 18.—N° 640.

FONTAINEMOREAU, Peter Armand le Comte de. — (*A communication.*)—Churn.

The first part of the improvements consists in constructing churns of "sheet or tinned iron."

The second relates to a peculiar construction of churn. A cylindrical vessel is contained within another which may hold hot or cold water. The inner cylinder is fitted about its circumference with perforated partitions parallel to the axis. It has a hollow spindle mounted within it on which are perforated wings or dashers. The spindle is revolved by gearing above or by an endless band and pulley. Below it is a small turbine wheel, the chambers of which communicate with the interior of the spindle. The object of this is to draw air down through the spindle and discharge it into the cream, &c.

A flat pan with a strainer in the spout is used for pouring the milk.

[Printed, 10*d*. Drawings.]

A.D. 1856, June 26.—N° 1503.

WALLER, Henry.—(*Letters Patent void for want of Final Specification.*)—" Vessels used in the manufacture of cheese."

The inventor employs a "circular vessel with a small vertical " chamber at the side. This chamber is closed by a shutter, " capable of sliding vertically in grooves, and divided horizontally into two, three, or more sections, the edges of the " divisions being bevilled or grooved so as to form a close " joint. Immediately behind this shutter" is "a small sliding " strainer (formed by preference of perforated metal). This " strainer is capable of moving vertically in grooves, and only " slightly exceeds in depth the height of one division of the " sliding shutter. In using this apparatus the curd is first " broken up by means of a revolving curd cutter of any " suitable form. When the curd has sufficiently settled, the " strainer is placed opposite to the upper division of the " sliding shutter, and that division of the slide is then withdrawn, which allows a portion of the whey to flow off into " the chamber, whence it is withdrawn by a tap or valve. " When the curd has settled still further, and the body of the " whey is brought to that level, the strainer is moved opposite " to the second division of the sliding shutter, which is next " withdrawn, and so on until the whole of the whey has been " run off. The curd is pressed by means of an ordinary " pressing plate and screw."

[Printed, 4*d*. No Drawings.]

A.D. 1856, July 21.—Nº 1714.

WARREN, James, JONES, John, and CROWTHER, Benjamin.—(*Provisional protection only.*)—Churn.

The following is the whole Provisional Specification :—"On " a pair of rockers we propose to place four standards of any " convenient height in such wise as to allow a box or case to " swing between (or the case may be made to move by the " action of the rockers only without swinging). To secure " the tops of the uprights in position, two cross bars pass " over, covered with tubing, so as to allow the cross bars or " rods to work therein. Between the framing so formed the " box or churn is attached or suspended. This churn box " may be made of any suitable material, form, or size; is " provided with a lid into which the milk is poured; the " churn is then set in motion, similarly to a swing or child's " cradle, and in a short time the butter is formed; the buttermilk is strained off through a tap in the casing. One or

" more holes or perforations is or are made in the top of the " casing to allow air to escape."

[Printed, 4*d.* No Drawings.]

A.D. 1856, July 21.—N° 1716.

GAUDIN, Marc Antoine Augustin, and CHOUMARA, Eugène Xavier. — "Manufacturing factitious wholesome " milk."

Meat or bones are boiled in a "double-cased closed boiler," " heated with steam at from three to five atmospheres pressure." " The milk is produced by the juice rushing out with violence " through the aperture of a stop-cock suitably disposed at the " top," "which juice has been brought to a tremulous ebullition " by the high temperature." When the level of the liquid falls below the end of the discharge pipe, fresh material is introduced, or more liquid is turned on from supplementary boilers. The juice can be "deprived of its fleshy smell by " steaming out the boiler through its half-opened cock," " and seasoning it by a moderate addition of sweet vegetables" and salt. "The steam must not be raised beyond three " atmospheres," and the discharge pipe has a valve which opens at that pressure. The proportions are about a pound of animal matter to a gallon of water. To produce "a milky " liquid suitable for industrial purposes," oils, wax, and rosin are substituted for animal matter. Also "clotted cow milk" can be turned into "a new fluid of a palatable taste" by boiling in the apparatus with "a small addition of carbonate " of ammonia."

[Printed, 4*d.* No Drawings.]

A.D. 1856, October 9.—N° 2363.

CLARK, William Stettinius. — (*A communication.*) — Churn.

The churn is of any suitable shape, and has a vertical spindle revolved by gearing affixed to one half of the cover, which is made in two parts. On this spindle is fixed a dasher of peculiar construction. It has three or four "concavo-convex " side extensions or chambers," "which is termed an 'ogee' " form, one half the surface being concave and the other con- " vex; these are termed 'revolving reservoir dashers.'" The *dasher is hollow*, and has an opening at the top by which it may be filled with hot or cold water as required. It thus consists of one chamber formed with wings, the concavities of which are turned in the direction of the motion of the dasher. It may also be made of several separate wing-shaped compartments surrounding a central tube. Round the interior of the churn are set some fixed breakers "formed with a ridge and " concaves." These like the dasher are hollow to admit water.

[Printed, 10*d*. Drawings.]

A.D. 1856, November 12.—Nº 2658.

PATTERSON, JOHN.—Apparatus for washing and churning.

As used for churning, the apparatus consists of an oblong box mounted on rockers, or slung from rockers working on overhead beams. A number of vertical pins may be fixed in the bottom of the box, or the box may be used without them. Motion is given to the box by a cross handle supported by two uprights fixed at one of the ends of the box.

[Printed, 10*d*. Drawing.]

A.D. 1856, November 28.—Nº 2820.

WALLER, HENRY.—"Vessels used in the manufacture of " cheese."

For compressing the curd a vessel without a strainer is used. After the curd has been cut up, a perforated plate which fits the vessel is placed on the curd, and allowed to sink down, when it carries down the curd and allows the whey to pass through it; as soon as it has sunk as far as its weight will carry it, the whey is let of, and the plate forced down by pressure. When nearly all the whey is removed, a solid plate is substituted for the perforated one, and pressure applied by any suitable mechanical means. The whey may be drawn off by a syphon, or by a series of taps at different levels, or by " sliding shutters " working in grooves in a vertical opening in the side;" but the inventor prefers to form a "narrow vertical opening in the " side of the vessel, opposite to which is a cylindrical chamber " closed by means of a tubular barrel tap, the hollow plug of " which is provided with a spiral opening working opposite " to the vertical opening in the vessel, so that by turning the " tap the point of draught is gradually lowered." As shown in the drawing, the upper part of the tap is fitted with a circular opening which comes opposite a small opening in the side of the vessel, before the top of the spiral opening coincides with the top of the slit. The vessel is preferably of brass.

[Printed, 6*d*. Drawing.]

A.D. 1856, December 5.—N° 2891.

CLYBURN, William. — (*Provisional protection only.*) — "Machinery for making butter."

The invention "consists in the employment of a rotating "agitator or beater in combination with certain stationary "arms." This beater consists of a spindle fitted with radiating arms at right angles which pass between sets of arms fixed to the sides of the vessel. The spindle may be hollow to admit hot or cold water. It is rotated by suitable gearing or by bands and pulleys. The vessel may be surrounded with an outer casing to hold water, or may be placed in a water bath.

[Printed, 4*d*. No Drawings.]

1857.

A.D. 1857, March 12.—N° 715.

TRAVIS, George.—"Apparatus used in the manufacture of cheese."

The invention relates to an apparatus for pressing curd. To a suitable vessel a perforated presser-plate is fitted with a central shaft working through a cross-bar supported by uprights at the side. On this shaft is formed a screw which works in a nut pivotted on a lever having its fulcrum on a second similar cross-bar. This lever is acted upon by a second lever with a fulcrum on the other side of the press; this second lever is double, consisting of two parallel arms, and rests on a pin which can be placed in one of several holes in the first lever. The second lever is weighted at its free end, and consequently the force of the weight is transmitted through the first lever on to the nut on the screw and so directly down to the presser plate. By means of a handle on the screwed shaft it can be rotated, and the nut raised, carrying with it the levers; *the weight then forces* the plate gradually down on the curds,

&c. as far as the lever can fall, when it is again screwed up and the operation repeated. The vessel is fitted with a strainer that can be slid into an opening in one side. It has a "flat "back which rests against the side" of the pan, and "its "front is semicircular and of perforated metal," so that a space is formed into which the whey can pass and afterwards escape through a hole furnished with a plug.

For cutting the curds a frame is used fitted with two sets of cutters, one above and at right angles to the other. The frame has a handle at top, by which it is worked. The cutters are preferably of "strips of tin plate."

[Printed, 10*d*. Drawing.]

A.D. 1857, May 4.—Nº 1254.

HOWARD, Joseph, the younger, and **HOWARD, William**. —(*Provisional protection only.*)—"Apparatus for the manu-"facture of cheese."

The following is the whole Provisional Specification :—"This "invention consists in adapting to the above-mentioned appa-"ratus a hollow perforated movable strainer in connection with "a tap fixed to the casing of the apparatus, for the purpose of "draining, drawing off, or separating the whey from the curd. "I also employ compound leverage for exerting pressure upon "the curd to express the whey therefrom. The fulcra of the "said levers are pins respectively placed in a piece situated "crosswise of the casing of the apparatus, and another piece "placed vertically against the same."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 4.—Nº 1259.

TRAVIS, George.—"Apparatus used in the manufacture of cheese.

The vessel used has at one or more sides two or more holes in it, one below the other and both below the level of the milk. These holes are kept plugged till the whey is to be run off, when the plug of the upper hole is removed and the whey allowed to flow from the surface of the curd as it is pressed down "over a sliding valve or gate, the upper edge of which "is always kept slightly below the surface of the whey in the "vessel." The valve moves between guides fixed on the inside of the vessel, and "is caused to descend as the pressing "plate on the surface of the curd descends by the pressure

" applied thereto." It "is of a curved form, projecting a " distance into the vessel, the lower part being closed," and " is of such a depth that it comes below the upper hole." As the " valve descends, its lower part or closed bottom comes " below the second or lower hole, and the whey is discharged " through that hole. The valve or gate is so constructed and " worked that it may be caused to descend low enough to run " off all the whey from the upper surface of the curd."

[Printed, 8*d*. Drawing.]

A.D. 1857, May 21.—N° 1433.

BLACKLIDGE, William, junior, and READ, George.—(*Provisional protection only.*)—Churn.

In the centre of the churn is a "beam or pillar" "having " grooves or indentations, dovetailed or otherwise running " along its sides," in which are fitted "sliding bars or rods, " having attached or fixed at right angles to their lower end " segments of discs or rings perforated with holes" and " forming a complete but disconnected piston." These rods are to be caused to work so that they work up and down at different times. If preferred some of the segments may be fixed, and the others work between them. The segments are to be so arranged that "in their working each passes or clears " the passage of the other at about one-third the depth of the " cream in the churn."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 27.—N° 1487.

CLARK, William Stettinius, and MOORE, Benjamin.—(*A communication.*)—(*Provisional protection only.*)—Churns.

The whole Provisional Specification is as follows :—"The " nature of our invention consists in giving such direction to " the cream placed in the tub of the churn by the action of the " agitator that it shall assume the character of a screw. The " shaft is placed diagonally in the tub, its position enabling us " to create a vortex or whirlpool ; one end of this shaft enters " a step secured to one side of the bottom of the churn, while " the upper drops into a slot or bearing upon the upper edge " thereof ; a suitable handle serves to rotate the shaft and " dashers, which are of the following construction, resembling

" a screw; these wings are secured to the shaft at right angles " to the shaft; these dashers being perforated to allow of " the cream passing through them, rendering the working " easier."

[Printed, 4*d*. No Drawings.]

A.D. 1857, August 13.—N° 2157.

McADAM, Robert.—" Apparatus to be employed in making " cheese and in drawing off liquids."

In so far as refers to the present series the apparatus is designed for separating the whey from the curds. It "consists of a small vessel or receptacle, which is made to float at " or near the surface of the liquids or matters to be separated, " by means of a shallow air vessel, or otherwise. The sides of " the receptacle are made of wire cloth, or other perforated " or permeable material, through which the lighter liquid " enters to the interior thereof." The perforated material " is of such a fineness as to prevent the curds from entering " along with the whey." The whey passes off by a pipe of flexible material, or made with telescopic joints, to a tap or spigot fitted into the lower part of the tub. To use the apparatus "the curds are minutely broken, which causes them to " settle down, the whey rising to the surface. When the " liquids are at rest, the floating separator is introduced, and " is attached to the flexible pipe previously connected to the " bottom of the vessel containing the curds, but having its " mouth kept above the surface of the liquid until the " separator is attached to it."

[Printed, 6*d*. Drawing.]

A.D. 1857, August 25.—N° 2247.

NICHOLLS, William.—(*Provisional protection only.*)— " Apparatus for warming milk."

The following is the whole Provisional Specification :—" This " invention consists of a portable vessel into which hot water " is placed, the temperature of such water being maintained " by placing heaters within said vessel after the manner of an " ordinary tea-urn, said heaters forming an important feature " in this invention. This apparatus when used for warming " milk, is placed in the vessel containing the milk, and a " *thermometer* is held therein to ascertain when it has been " *sufficiently* warmed, after which the apparatus is lifted out

" of the milk. By the above improved apparatus the heaters " serve to keep up the temperature of the hot water as the " cold milk robs it of its caloric."

[Printed, 4*d*. No Drawings.]

A.D. 1857, August 27.—N° 2266.

McISAAC, John.—(*Provisional protection only.*) —" Apparatus for washing or churning."

The apparatus as described in the Provisional Specification, and figured in a small woodcut in the margin thereof, consists of a box mounted on rockers and fitted with handles by which it may be rocked. For churning some cross-bars are placed in the box.

[Printed, 4*d*. No Drawings.]

A.D. 1857, September 1.—N° 2290.

BRADFORD, Thomas.—Washing and churning apparatus.

As applied to churning the apparatus consists of a box of suitable shape mounted in trunnions on a frame. On each end of the box is a metallic disc with two studs thereon. Springs are fixed on the frame in such a position that when the box is rocked from side to side, the studs strike against the springs and prevent its entire revolution, thus breaking the shock at each oscillation and serving to reverse the motion so as to lessen the labour of working the box backwards and forwards. On one of these discs there is a handle by which motion is given to the box. Within the box is "an arrange- " ment of traverse horizontal and vertical bars" which may be hollow to contain water for regulating the temperature of the cream. The box is furnished with a suitable lid secured by catches. The apparatus may be driven by hand or by power.

[Printed, 10*d*. Drawing.]

1858.

A.D. 1858, February 4.—N° 203.

HARRISON, Joseph.—"Apparatus for making cheese."

A toothed rack is arranged above the cheese vessel, so as to be capable of sliding between two vertical parallel bars carried by suitable framing. "To the lower end of this rack is " attached a wrought or cast-iron plate which is pierced with " several holes and fits the inside of the vessel. These holes " are covered with finely perforated metal plate; this plate is " wound up or drawn out of the vessel and pushed out of the " way when required, so as to leave the vessel clear for the " operation of cutting up the curd. The rack with the metal " plate are moved in and out of the cheese vessel by means " of a toothed pinion keyed upon a shaft which is mounted " in suitable bearings; upon the end of this shaft is also " keyed a grooved wheel or pulley, round which a chain " passes to a grooved guide wheel or pulley below. To this " chain a weight is attached which gives motion to the pinion, " and thus lowers the rack and perforated plate to sink or " separate the curd from the whey in the cheese vessel. " There are also two strong springs, one end of each of which " is made fast to the framing, and the other end is free to " move with a casting which carries a catch or ratchet, and " which is made to move up and down the rack. This catch " takes into the teeth of the rack, and by raising the catch " the springs are compressed, and sufficient pressure is " obtained to free the curd from any whey which may be left " after the sinking process. The whey is let off from the " vessel by means of two or more valves provided with pistons " and placed at different heights, the opening into the cheese " vessel being covered with perforated metal to prevent the " passage of the curd."

[Printed, 6*d*. Drawing.]

A.D. 1858, March, 12.—N° 500.

THOMPSON, THOMAS.—"Vats for cheese making."

"The apparatus consists of a circular vat or vessel into " which is fitted a false bottom or tray perforated over the " whole of its surface. This tray is kept at a certain distance " from the real bottom of the vat by means of ribs on its " under side, and on this tray the curd is placed. Attached " to a suitable framing and actuated by a screw is a perforated " presser; this being caused to descend upon the curd forces " out all the whey, which finds an escape by means of the " chamber between the false and true bottoms of the vat, " and from thence by a spout or pipe attached to the said vat."

[Printed, 6d. Drawing.]

"or stirrers, to which a lateral, alternating, or rotatory move-
"ment is given by the employment of a link motion attached
"horizontally to the said spindle, which is driven direct from
"a crank action through the intervention of a connecting rod
"and fly wheel."

[Printed, 4*d*. No Drawings.]

A.D. 1858, September 22.—Nº 2125.

JOHNSON, James.—(*Provisional protection only.*)—Washing, churning, colour-mixing, &c.

The following is the whole Provisional Specification:—"I
"place the peggy or other article employed for washing,
"churning, &c., either in the ordinary tub or any suitable
"vessel, and give it a to-and-fro curvilinear motion, by placing
"its rod or shaft in the boss of a bevil wheel geared into
"another bevil wheel, which has an alternate curvilinear
"motion imparted to it by fixing on its shaft a lever having
"a stud placed in a slot of one of the arms of a double lever
"working on a fixed stud, the other arm being connected by
"a rod to a crank pin on a toothed or other wheel, having
"motion given to it by gearing, pullies, or other suitable
"manner. The shaft of the peggy moves to and fro, and
"also up and down, as required, by means of a key and slot
"in the bevil wheel placed upon it."

[Printed, 4*d*. No Drawings.]

A.D. 1858, October 25.—Nº 2381.

KENT, George.—(*A communication.*)—Churn.

The object of the invention is to cause air to mix thoroughly with the cream.

Round the central vertical spindle of a churn several tubes are arranged with their upper ends close to the spindle, and their lower ends supported by arms carried by the bottom of the spindle, so that they have an inclined position. The tubes are open at top and bottom, the opening at the lower end being formed by cutting away a portion of the side, or "slicing the "end off diagonally." A fan or vane is fitted to the lower end of each tube, in order to assist in forming a partial vacuum at the end of the tube, by which air may be drawn down it. *The spindle is rotated* by a handle and gearing at the top of *the vessel.* The vessel may be round or square, but in the former case fixed vanes are arranged round the side. The lid is held in position by having lugs thereon through which pins are passed and hold against projections on the sides. The vessel may be fixed to a table by screws, or may have a flange on it sliding in a groove thereon.

[Printed, 10*d*. Drawing.]

1859.

A.D. 1859, February 5.—N° 333.

TINKLER, ROBERT.—Churn.

1. A method is described for fixing a barrel churn in any required position, for filling or emptying it. The churn is formed of a suitable barrel-shaped vessel mounted on trunnions in a frame. and revolved by a winch. On either end of this is a segmental plate with holes therein, and into these a bolt on the frame can slide, so as to clamp the whole in position.

2. An improved bung is described. This consists of a circular piece of india-rubber fixed by screws and nuts to a metal backing. The metal may be dished or flat, and may have a piece of wood thereon to form a handle.

3. A valve for admitting air is described. A tube is screwed into the side of the churn, the bottom of which is bevelled to form a valve seat for a conical valve held against its seat by a helical spring bearing against a nut on the top of a spindle fixed to the valve, and also against a fixed boss through the centre of which the valve-spindle slides. By pressing down the nut on the end of the spindle, the valve is depressed and air is allowed to escape through perforations in the tube.

The metal of the valve apparatus and the bung may be electro-plated.

[Printed, 8*d*. Drawing.]

A.D. 1859, February 8.—N° 353.

WALLER, WILLIAM.—(*Partly a communication from William Rogers.*)—(*Provisional protection only.*)—"Farm "*implements.*"

Several improvements in farm implements are described; amongst others,—

"An improvement in presses for cheese, curds, fruit, or "other substances, consists in constructing such presses so "that the weight of the cheese or other matter produces the "pressing action. To this end the apparatus is mounted "upon a table, which is carried by rods or levers jointed to "a standard in such a way as to keep the table horizontal. "When the cheese or curd in the mould is placed upon the "table, the cover secured, and the support removed, the "whole tends to descend, but in doing so imparts an angular "motion to the levers, by which angular motion of the levers "the presser is made to act, being connected thereto for that "purpose. The compressing force may be increased by "placing a weight upon the table, or one or more of the levers "may be extended beyond the standard to receive weights "by which the compressing force may be regulated."

[Printed, 4*d*. No Drawings.]

A.D. 1859, March 16.—Nº 663.

FULLER, JAMES.—(*Provisional protection only.*)—Churns.

The following is the whole Provisional Specification:—"A "revolving axis formed with a series of arms or beaters "which are placed around such axis so as to succeed each "other step by step, and they are each formed inclined "towards their opposite edges, by which, in the rotary "motion of the axis, the cream will be forced downwards. "The upper and the lowermost of the beaters are fixed with "their broad sides in the direction of the axis, the better to "clear the top and the bottom. Motion is given to the axis "by a pinion fixed thereon taken into by a wheel with handle "or by other suitable means."

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 6.—Nº 859.

LUFF, THOMAS PURNELL.—(*Provisional protection only.*)—"Cheese vats."

The following is the whole Provisional Specification:—"My invention of improvements in cheese vats consists in "making those vessels or utensils of metals instead of wood, "*as used* heretofore in cheese vats. I refer to those vessels "in which cheeses are pressed. I make them of the proper "form, with a loose shifting bottom and a disc or follower, to "be laid on the top of the cheese, and more or less perforated "as required. I make them usually of tin plate, but "galvanized iron, tinned, or plated iron or copper, or other "suitable metals, may be used for the purpose."

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 9.—N° 892.

DERHAM, Richard Jones.—(*Provisional protection only.*) —"Cheese vats."

The following is the whole Provisional Specification:— "The cheese vat now in use is a block of turned wood from "which there is much trouble in getting the cheese liberated "from it, and in many cases the vat is broken in the opera-"tion. My improvement is to form a vat of staves with "galvanized or not galvanized spring hoops, so that the hoops "may open the staves and thereby easily disengaging the "cheese from the vat. This vat will make cheese considerably "faster than those now in use."

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 19.—N° 989.

MAGGS, OLIVER.—(*Provisional protection only.*)—Cheese pressers.

The whole Provisional Specification runs as follows:— "This invention has for its object improvements in cheese "presses. For this purpose a press is made with a suitable "bed-plate or surface, on to which the cheese is placed, and "it has two or other convenient number of uprights, which "serve to guide the platter or pressing surface as it is raised "or lowered by a screw. The two uprights are connected "together by a suitable crosshead or framing, in the centre "of which is formed a hollow socket to receive elastic or "spring material, by preference, rings of vulcanized india-"rubber. The nut in which the screw works is formed with "a projecting flange at its lower end, on which are two "descending guide pins, which pass through two holes in the "lower part or plate of the hollow socket formed in the "crosshead. On the flange around the nut one or more rings "of vulcanized india-rubber or other elastic material is or

" are placed; and there is a shoulder within the hollow socket " in the head of the press, against which the upper ring of " india-rubber presses."

[Printed, 4*d*. No Drawings.]

A.D. 1859, July 30.—N° 1772.

JAMIESON, William. — (*A communication from Oliver Gunnell.*)—(*Provisional protection only.*)—Churn.

The following is the whole Provisional Specification :— " This invention consists of a square wooden box having a " wooden pillar in the centre thereof, resting on a pivot, and " moving in a recess in the bottom of the box; the lower part " of this pillar has four or more projecting arms attached, at " the end of each of which is secured a flat piece of wood at " an angle of about 45°. Upon the upper end of the said " pillar, which passes through the lid of the box, is affixed a " bevelled toothed wheel, the teeth of which work into another " similar wheel affixed to a suitable bearing; these wheels " are set in motion by means of a winch handle, which also " sets in motion the cross arms and pillar inside the box. " The flat pieces being set to the required angle, are somewhat similar in their action to the archimedean screw, " having the effect of beating the cream against the sides and " corners of the box without causing the slightest splashing, " and will make butter in a more speedy and efficient manner " than heretofore."

[Printed, 4*d*. No Drawings.]

A.D. 1859, November 12.—N° 2567.

LANSDALE, Richard.—Washing and churning machine.

The apparatus consists of a vessel of any suitable shape, to which a "double rotary motion like that of the earth" is given. The vessel is mounted on trunnions vertically in a frame which is mounted horizontally. The frame is revolved by a winch handle acting directly or through gearing, and the same handle actuates gearing which rotates a bevel wheel taking into the cogs of a toothed ring fixed on the vessel, which is therefore rotated in a direction at right angles to that in which the frame is moving at the same time. The same effect is produced by making the bevel wheel fixed, which takes into the ring on the vessel. By means of a toothed sector the motion may be made reciprocating instead of rotary, if preferred.

The interior of the vessel may be studded with projecting bosses, and a grid may be fitted therein. It may have a "waste cock" and valve. The top is made in two parts, one of which is fixed while the other is removeable, to form a lid. It is secured by a screw.

The apparatus may be driven by hand or by power.

[Printed, 10*d*. Drawing.]

A.D. 1859, December 20.—N° 2902.

NEWTON, ALFRED VINCENT.—(*A communication from John Booth.*)—Churn.

The churn is cylindrical and is made with interior projections. These are formed by making some of the staves of which the barrel is composed of considerably greater thickness at one edge than the other. By this means vertical ribs are formed down the sides. The projecting portions are cut away at bottom to allow the lowest dash-board to pass under them, and at top to form shoulders on which the lid rests. The dasher is composed of a central shaft with wings or blades thereon. The lowest pair are longer than the rest, and their ends pass under the projections on the sides; the others are shorter, and just clear the projections. The blades are triangular in section, and are set with one side vertical; they are arranged alternately on the shaft, at right angles to each other. The shaft is driven from a winch handle above, by gearing supported on a cross-bar at the top of the churn.

[Printed, 6*d*. Drawing.]

A.D. 1859, December 20.—N° 2908.

JOHNSON, JOHN HENRY. — (*A communication from Silvanus S. Riker, Payton Spence, Isaac W. Morrell and Leonardo Westbrook.*)—Churn.

A vessel of suitable shape has within it a dasher revolving on a horizontal spindle. On one end of the dasher shaft is a disc, and concentric with the disc is a similar one fixed on the end of the vessel. The cream is admitted from a hopper above to an opening in the fixed disc and passes into the space between *the two discs* and thence out into the vessel beyond to be acted upon by the dasher. The faces of the discs may be close together, so as to exercise a rubbing and grinding effect on the milk, or they may have radial ribs or studs, or one may have a bead fitting into a corresponding groove in the other for the same purpose. Also both discs may revolve, and in opposite directions, in which case the cream is admitted by on opening at the centre of one of them. The vessel has a "glazed spy-hole." The dasher is revolved by a winch handle acting through a multiplying wheel. It is fitted with radial arms at right angles to the shaft, or the arms may be arranged in pairs at such an angle to the shaft that each pair forms a **V**, the point of which is on one side of the shaft, and the two ends on the other.

[Printed, 8*d*. Drawing.]

1860.

A.D. 1860, January 4.—N° 27.

GAMMON, CHARLES. — (*Provisional protection only.*) — Churn.

The entire Provisional Specification is as follows:—"And " consists of a cylindrical vessel, within which I mount a " vertical spindle or shaft, having fixed to it 3, 4, or more " vanes of a gridiron form; upon a prolongation of the spindle " extending beyond the cover of the cylinder is mounted a " pinion, which gears into a segmental rack; a vibrating lever " turning on a centre is fixed to that last-mentioned rack, so " that when raised or lowered the rack is made to vibrate with " it, and acting upon the pinion gives to the spindle and the " vanes an oscillatory reciprocating motion, which produces " the required effect on the article to be operated upon. If " the apparatus be made use of for beating or churning eggs, " the pinion and rack may be omitted, the spindle being " carried straight up, its extremity forming a handle; the " oscillatory motion is then obtained by rolling or turning the " handle between the palms of the hands."

[Printed, 4*d*. No Drawings.]

A.D. 1860, January 24.—N° 177.

BLAXLAND, Henry. — (*Provisional protection only.*)—Churn.

The whole Provisional Specification is given in the following words :—"My invention, which has reference to an improved "churn by which the process of churning may be simplified, "consists of a chamber or hollow case mounted horizontally "upon a rocking frame or stand, to which motion is given for "the purpose of actuating the same, and causing the milk or "cream to be thrown or driven from end to end of the said "chamber, and thereby churn, the said ends being so arranged "as to present a surface vertically opposed to the action of "the milk or otherwise, and a beater or stirrer employed and "worked in like manner if necessary."

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 21.—N° 468.

DERHAM, Richard Jones.—(*Provisional protection only.*)—Churns.

The following is the whole Provisional Specification :—"The butter churns that are in present use are the barrel "churns with paddles inside, with a large bung hole cut in "one stave to put the cream in and to take the butter out "when made; this churn is made of wood staves, and revolves on a frame or stand by turning a handle, and there "is a good deal of trouble to keep the inside clean and sweet.

"My improvement is to take a part of this churn off the "side, or one of the heads out, to allow the butter maker the "facility of putting both hands and arms in, or a scoop, to "take the butter out when made from the churn; the churn, "called the pump churn, which is now used with a long "handle, worked parallel, and very tiresome to work, I intend "to work with a revolving paddle, to be turned with a metal "or wood handle attached to two cog wheels, the whole to be "attached to a metal or wooden top, which can be taken off "when the butter is made, to remove the butter from the "churn. This churn may be made of wooden staves or "metal."

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 13.—N° 670.

NEWTON, ALFRED VINCENT. — (*A communication from Edward Lynch.*)—(*Provisional protection only.*)—Churns.

A "floating breaker" is used, which floats on the surface of the cream in the churn. It consists of a ring with projecting radial arms which slide in vertical grooves in the sides. There may also be a fixed breaker set a little above the dasher. The dasher is made with blades "set after the manner of ordinary "propeller blades." There are also short breakers fixed to the side of the churn.

[Printed, 4*d*. No Drawings.]

A.D. 1860, March 28.—N° 798.

HANCOCK, JAMES LAMB. — "Apparatus for working and "shaping butter, and for separating it from the buttermilk."

The butter is placed in a cylinder with a perforated bottom. On the top of the butter a piston works, driven by a screwed rod working through a nut in the lid of the cylinder. The lid is held on by a flange fitting under a flange on the cylinder, or on a frame in which the cylinder may be set so that it can be supported over a pail of water, into which the butter can be squeezed out. The bottom of the cylinder may be made of a perforated plate, so that it may be removeable. The holes may be of any suitable shape. After the butter has been washed, the apparatus may be removed and placed on supports which retain it in a nearly horizontal position, so that the butter may be again placed in it, and forced out on a slab placed to receive it at the end of the apparatus.

[Printed, 6*d*. Drawing.]

A.D. 1860, April 17.—N° 962.

PATTERSON, JOHN.—Apparatus for churning and washing.

Two churns are described.

In the first, a vessel of suitable shape is mounted on a pivot set eccentrically on a disc with a vertical axis. This disc has a heavy rim, so that it acts as a fly-wheel. Handles are fitted to the vessel, and it is worked by being caused to describe a circle round the centre of the disc, without at the same time revolving on its own axis. Dashers are fixed to the sides.

In the second a vessel is mounted on a centre pivot which works in a cup on a bed-plate, this cup being sufficiently large to allow the vessel to lean over from the perpendicular, so that it rests with a point of its lower edge on the bed-plate. It has a handle on the top, and is worked by being rolled round on its pivot.

[Printed, 6*d*. Drawing.]

A.D. 1860, April 19.—N° 982.

HARBEN, Benjamin, and HATHAWAY, Richard Isaac.—(*Provisional protection only.*) — "Substitute for ordinary " butter."

The following is the Provisional Specification :—"This in- " vention consists in compounding into a mixture certain " ingredients not heretofore employed in combination, which " we propose to use as a substitute for butter in the manu- " facture of pastry, biscuits, and for general culinary purposes " in which butter is now used. The ingredients we employ " are the fat of meats, butter, and oil, in the proportions of " about eight parts of fat, four parts of butter, and one part " of oil. The fat, being first divested of strings or ligatures " and fibres, is mixed with the butter and oil in a cold state, " and if desirable salt added thereto. The above mixture " possesses all the elements of ordinary butter essential for " the manufacture of pastry, biscuits, and for general cul- " inary purposes, with the advantage of being considerably " cheaper."

[Printed, 4*d*. No Drawings.]

A.D. 1860, April 23.—N° 1012.

BROOMAN, Richard Archibald.—(*A communication from Louis Pierre Huard.*) — (*Provisional protection only.*)— Milk-cans.

The following is the whole Provisional Specification :—"This " invention consists in constructing milk cans of thin sheet " steel in order to obtain lightness and durability, and in fitting " them with covers in such manner that the contents cannot " be tampered with without the same being discovered. The " mouth of the can is narrowed, and is fitted with a steel " ring round the inside thereof, against which the sides " of a conical capsule-like cover rest ; from the edge of the " mouth of the can there rise two staples, which pass through

" apertures provided for the purpose in the rim of the cover ;
" round the apertures through which the staples pass a dish
" or cup is formed for the reception of sealing wax. Two
" bars are fitted to the cover, and extend beyond the edges
" thereof. The cover being applied to the mouth of the can,
" wax is dropped into the cups round the two staples, and
" any desired seal or stamp applied thereon ; without breaking
" the wax the cover cannot be removed. To open the can, a
" few blows with a hammer under the projecting bars will
" break the seals, and the cover can be removed. To prevent
" the covers being lost they are secured by a chain to the
" cans."

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 15.—N° 1197.

SALISBURY, SILAS C.—(*A communication from George W. Mears.*)—" Apparatus for churning butter."

The object of the invention is to effect the churning of butter in a vessel in which the air is compressed. The apparatus used is preferably an air-tight vessel of suitable shape mounted on trunnions in a frame, and capable of being revolved. The lid is secured air-tight by means of india-rubber packing or otherwise. In it is an opening to which a force pump can be applied to compress the air. In the Provisional Specification this pump is described as consisting preferably of a bellows arrangement with suitable valves operated by a lever pivotted to the lid. The vessel is to be filled about one-third full of cream, air is then forced in as long as it can easily be done ; the pump is then detached and the vessel rotated.

Churning may also be effected by exhausting the air so as to lessen the pressure. In this case a dasher is to be used.

The apparatus is fitted with a glazed aperture through which the progress of the operation can be watched.

[Printed, 6*d*. Drawing.]

A.D. 1860, June 23.—N° 1535.

DINSMORE, DAVID CROSMAN. — (*A communication from Rufus Lapham and Riley P. Wilson.*)—(*Provisional protection only.*)—Churn.

The following is the whole Provisional Specification :—
" The nature of this invention consists in churning butter by

" means of the combined action of compressed or expanded " atmosphere and agitation in an air-tight vessel, the pressure, " when the air is compressed, being excited externally, and " when expanded, it is exerted internally upon the globules " or sacks containing fatty matter.

" I employ a vessel of suitable shape for agitating the milk " or cream in, and mount or suspend it upon a suitably constructed frame at or about its centre; this vessel has an " air-pump placed on the top or other convenient part, and " an opening formed with an air-tight cover of any suitable " mechanical contrivance for the admission of milk and cream; " thus it will be seen that by forcing air into the churn the " globules or sacks containing the fatty matter are thrown " more compactly together, and by moving the vessel speedily " for a few minutes by means of a winch handle, the manufacture of the butter is complete."

Printed, 4*d*. No Drawings.]

A.D. 1860, July 23.—N° 1781.

SULLIVAN, John Wells.—(*A communication from Charles Sullivan and William Francis Hyatt.*)—" Washing and " churning."

The apparatus consists of two concentric cylinders one within the other, set up either horizontally or vertically in a suitable frame. The inner cylinder has beaters on its outside, and the outer one beaters on its inside. Motion in opposite directions is given to the two cylinders by means of a winch handle acting through suitable gearing. The inner cylinder may be solid, or may consist of framework. There is a watertight lid to the outer cylinder, consisting of two metal plates with a thickness of india-rubber between; it is secured in its place by bolts. In the lid is a spring valve. A trough or box may be arranged to receive overflow.

No special modification for churning purposes is described.

[Printed, 8*d*. Drawing.]

A.D. 1860, August 10.—N° 1939.

SUMMERSCALES, John.—(*Provisional protection only.*)—Churns, &c.

The invention is applicable to several purposes. When applied to churns it " consists of a vessel enclosing a com-

" pound agitator which can be worked by three, four, or
" more wheels at pleasure, having only one central shaft,
" and may be turned either by hand or other motive power.
" The compound agitator consists of two drums or cross bars
" furnished with radial arms projecting inwards and keyed
" upon the central shaft, which turns in one direction, whilst
" a tubular shaft or long hollow boss furnished with radial
" arms or beaters projecting outwards and working within or
" between the first-named radial arms turns in the opposite
" direction. Thus a double compound movement is created,
" and the cream is worked up into butter much quicker than
" by the churns hitherto in use."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 10.—N° 2468.

HORNSBY, Richard, junior.—Churning, &c.

As intended for churning the apparatus consists of a vessel of any suitable shape, but preferably oblong, mounted in trunnions on a frame, and having below it a weighted box so that it can be swung backwards and forwards. On the bottom is what is termed a "bridge," or raised projection, made with perforations so as to allow the passage of liquid through it from side to side. This is preferably made of a series of parallel plates, more or less triangular in shape, and arranged so as to form a sort of ridge along the bottom of the vessel. There is a lid in the centre of the top, fastened by a catch, the parts of the top beside the lid being fixed.

[Printed, 10*d*. Drawing.]

A.D. 1860, October 27.—N° 2634.

NEWTON, William Edward.—(*A communication from L. O. Colvin.*)—"Apparatus for milking cows."

A pail is made with a fixed half cover to it, in the middle of which is fitted a tube connected with a chamber having on each side another chamber. Each of these second chambers has two pipes, each ending in a cap which fits one of the cow's teats. There are thus four pipes leading into two chambers. One side of each chamber is formed of flexible material with a metal disc in the centre, and the openings leading to the teats and the central chamber are fitted with valves, so that by pressing the metal disc in and out a pumping action is set up which draws the milk from the udder and discharges it into the central chamber whence it runs into the pail. The discs are worked by a pair of lever handles, the fulcra of which are formed by sockets sliding on a pair of upright bars affixed to the pail. The cap which fits over each teat is conical, and has within it a series of rings which serve to hold the teat firm and make an air-tight joint.

[Printed, 8*d*. Drawing.]

1861.

A.D. 1861, January 18.—N° 142.

MASON, Robert.—(*Provisional protection only.*)—"Wash-" ing and churning."

1. The first part of the invention consists in "mounting " that class of machine which has a bridge or raised bottom " forming a ridge" "on an axis, on which it rocks to and fro, " instead of on rockers."

2. India-rubber springs are attached to the bottom of the vessel so that its oscillations are controlled and assisted by them.

3. A "door or leaf" is suspended above the "bridge." This is composed of a series of bars, which may be formed with bosses thereon. There may be ribs on the sides and bottom, formed of rows of balls or bosses. The bottom slopes from the centre towards the ends.

[Printed, 4*d*. No Drawings.]

A.D. 1861, January 26.—N° 211.

WEBSTER, Frederick William.—"Washing and churning.'

A cylindrical or barrel-shaped vessel is mounted on trunnions in a frame, and provided at its ends with handles by which it may be swung to and fro. There are fixed dashers in it, solid, perforated, or hollow and fitted with pipes to admit air into the middle of the cream.

No other part of the description seems to refer to the apparatus as arranged for churning.

[Printed, 10*d*. Drawing.]

A.D. 1861, March 15.—N° 661.

CLOUTMAN, William.—(*Provisional protection only.*)—
“ Tanks or vessels for dairy use.”

The whole Provisional Specification runs as follows :—“ My
“ improvements in tanks or vessels for dairy use consists in
“ making the same from slabs of slate, which are rabbeted and
“ screwed together at their ends so as to form the said vessels
“ of a rectangular shape of large dimension, but very shallow,
“ suitable for holding milk preparatory to its being skimmed
“ for the cream. The contents of each vessel are drawn off
“ through a hole in the bottom of the same, for stopping
“ which a slate plug is used. Tanks or vessels made accord-
“ ing to my invention will be more pure, cleanly, and durable
“ than those hitherto used, and much more economical in
“ first cost.”

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 1.—N° 797.

RUSSO, Gregorio.—(*Provisional protection only.*)—“ Sub-
“ stitute for saffron in the manufacture of cheese.”

The entire Provisional Specification is as follows :—“ My
“ invention onsists in the substitution of curcuma root for
“ saffron in all the various usages to which the latter is applied,
“ especially in the manufacture of cheese, pastes, vermicelli,
“ &c., &c. I employ it in the following way ;—I take a
“ quantity of curcuma root, grind it into the finest powder,
“ and use it in every way as a substitute for saffron. I claim
“ the exclusive right of employing pulverized curcuma root,
“ either alone or mixed with other substances.”

[Printed, 4*d*. No Drawings.]

A.D. 1861, May 4.—N° 1120.

ADDY, William.—Washing and churning.

As employed for churning, the apparatus consists of a vessel which may be cylindrical, but is preferably polygonal in its cross section, mounted on trunnions and provided with a handle and gearing by which it can be rotated. It is divided by a perforated partition passing through the axis, and has ribs across the interior. There is a lid in one of its sides properly secured. There is a spring valve opening inwards to admit air, and at each revolution the spindle of this valve strikes against a projection on the frame, so that it is opened.

[Printed, 6*d.* Drawing.]

A.D. 1861, May 6.—N° 1139.

JOHNSON, William.—"Churning and kneading."

Within a cylindrical vessel there is fitted a shaft carrying a screw of such radius as to occupy nearly the whole of the interior of the vessel. The screw shaft is produced outside the vessel and on it is cut a screw on which a nut with handles works, so that by moving the nut backwards and forwards, the shaft, and with it the screw inside the vessel, is caused to revolve alternately first in one direction and then in the other. The thread of the churning screw may be continuous or not, and there may be one thread or several. The blades are preferably perforated. The screw is made readily removeable. Other means than the method above described may be employed for actuating it. The cream is supplied through an opening at the top, and the butter when made may be forced out at the end of the apparatus by rotating the screw in one direction only. A scraper may be fitted to the screw, and mounted on a bar in such a way that it slides thereon, being carried by the movement of the screw.

[Printed, 8*d.* Drawing.]

A.D. 1861, May 29.—N° 1342.

HALLIWELL, John.—Churn.

Two vessels of similar shape are fitted together, one within the other, so that a space is left into which hot or cold water can be poured. The churning is effected by a vibrating dasher, composed of a frame of four wooden bars, pivotted at about the middle of its sides to points at the top of the vessel. To the lower part of the frame two gratings are attached, made of sheet zinc. They are fixed to the bottom bar, and slant slightly outwards from the frame. At their tops they are secured to a broad piece of wood, fastened across the middle of the frame about in a line with the pivots. As represented in the drawing the vessels are broader at bottom than above, and their sides slope inwards from the bottom.

[Printed, 6*d.* Drawing.]

A.D. 1861, May 30.—N° 1348.

WHITEHEAD, FRANCES ANN.—"Improvements in treating "cream or milk and in obtaining butter and other products "therefrom."

Cream after skimming is filtered through shallow sieves of "ordinary unbleached calico or sheeting of moderately coarse "texture" stretched on hoops; to aid the process "an absorbent material may be used to assist the filtration by "absorption or capillary attraction."

After standing for from 12 to 24 hours, the cream can be separated "in a solid cake or mass," and kneaded by the hand into butter.

[Printed, 4*d.* No Drawings.]

A.D. 1861, June 4.—N° 1405.

HUBBELL, ANSON. — (*Provisional protection only.*) — Churns.

The following is all the Provisional Specification. "My "invention consists in churning by means of two rollers armed "with spikes or projections, which I prefer to be corrugated; "the projections on one roller working between those on the "other roller, to which rollers rapid rotary motion is imparted "in a contrary direction through pinions on the roller shafts, "both driven by one toothed wheel.

[Printed, 4*d.* No Drawings.]

A.D. 1861, June 6.—N° 1426.

BAKER, GEORGE.—"Apparatus for churning and for beating "eggs."

The apparatus is described as constructed for the purpose of beating eggs. It "consists of an open vessel, on opposite "points on the sides of which two uprights are fixed, the said "uprights being connected by an arched top. In the axis of "the vessel is a shaft or spindle, which is supported at its "lower end in a bearing on the bottom of the vessel, and at its "upper end by the said arched top. That part of the spindle "which is situated in the vessel carries beaters or stirrers "arranged upon it radially, and the upper part of the said "spindle is in the form of a quick-threaded screw. On the "screwed part of the spindle is a screw box or nut, by working

" which up and down a rapid reciprocating rotatory motion is " given to the spindle and beaters or stirrers." "The liquid " to be operated upon is placed in the vessel, and the screw " box or nut worked up and down." "The spindle carrying " the beaters or stirrers may be removed for cleaning or other " purpose by unscrewing a button on the arched piece." The beaters are preferably of wire, as is also the screw, which is of wire soldered to the spindle. Instead of being fitted to a vessel, the apparatus may be attached to a ring which fits on a vessel.

When used for churning, the apparatus is larger and stronger than when used for beating eggs, and instead of two uprights to support the arched top, a single upright of greater strength may be used.

[Printed, 10*d*. Drawings.]

A.D. 1861, June 21.—N° 1596.

TURNER, George.—(*Provisional protection only.*)—Apparatus for beating eggs, mixing liquids, &c.

Amongst other uses the apparatus may be used for churning. A "rectangular frame" is rotated by any suitable means in a vessel containing the matters to be treated. The "flat surfaces " of the vertical bars" of the frame are "placed at an angle " to the outer circumference" of the vessel in order to drive the fluid under treatment outwards, and the inventor prefers " to form or intersect the rectangular frame with one or several " diagonal, horizontal, or angular bars." The vessel may have an outer jacket to receive water, &c. More than one frame may be used.

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 22.—N° 1608.

COMRIE, James.—Churn.

An elliptical vessel with flat ends is mounted with its longer axis horizontal on trunnions on its ends in a suitable frame. It is rocked to and fro by handles on the top, and has springs on it which strike against stops on the frame, thereby aiding to reverse the motion. Or it may have motion given it from a fly-wheel on the shaft of which is a crank connected by a rod with a crank on the axle of the vessel; this second crank is of longer throw than the other, so that a vibrating motion is given to it which oscillates the vessel. The fly-wheel is driven by hand or power. Within the vessel are three perforated vertical partitions which act as fixed dashers. There is a suitable lid in the top of the vessel, and by means of a thumb-screw in the frame, the vessel can be held stationary for the purpose of filling it.

[Printed, 8*d*. Drawing.]

A.D. 1861, July 8.—N° 1731.

HORNSBY, Richard, junior. — "Machinery for washing, "wringing, mangling, and churning."

A portion only of the improvements are applicable to churns. Churns which are intended to rock on pivots have a pair of handles fixed to the trunnion at one end, which extend upwards and are at an angle of about 45° to each other. The lid also is secured by an arrangement described as follows :—"I make "the joint between the lid and the tub with felt or other soft "material, and to force the lid in contact with the tub, I "place lugs on the tub inclined on the under side, and I "employ a cross bar, also inclined at the ends, and which to "fix the lid is placed thereon and turned round, so that its "ends pass under the lugs."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1861, July 30.—N° 1897.

BRADFORD, Thomas.—"Washing, churning, wringing, and "mangling machines."

A vessel of suitable shape is suspended by rods from a bar above, and has a rocking movement given to it by handles on the ends. The stem of the dasher is fixed to the frame above the vessel, and consequently the dasher is fixed. It has on each side of it a bar of wood, fixed at one end, and with the other resting against the stem of the dasher, so that they act as springs, The dasher consists of a cross-bar fixed to the upright stem above-mentioned, from which projects downwards a series of vertical bars. The bottom of the churn is fitted with bars between which the dasher bars alternate. "Button-"shaped or rivet-head knobs" are fixed on the dasher and on the bottom bars.

[Printed, 10*d*. Drawing.]

A.D. 1861, September 26.—N° 2400.

BENTLEY, Thomas.—"Apparatus for beating eggs."

The invention is described as intended for use as an egg beater, and is stated to relate "to improvements in that de-"scription of apparatus for beating eggs or other matters "known as the 'Archimedian egg beater,' which consists of "an axis on which a spiral or screw thread is formed, the "lower end having an open wire frame or beater attached "thereto, the whole being caused to rotate in opposite direc-"tions alternately by moving a sliding socket containing a "pin, which enters between the threads of the spiral or screw "up and down thereon, the upper end of the axis being held, "whilst the lower end rests on the bottom of the vessel con-"taining the eggs or other matters to be beat or stirred. The "invention consists in forming the Archimedian screw or "spiral upon a tube to which the rotary beaters are attached, "this tube and beaters being caused to rotate upon and around "a fixed central axis, to the lower end of which a fixed frame "with stationary arms is attached, which may intersect or "surround the arms of the rotating beaters. Rotatory motion "is communicated alternately in opposite directions to the "beaters by a sliding socket (containing a pin, which enters "between the threads of the screw on the hollow axis), which "is moved up and down whilst the central axis is held sta-"tionary by hand or in a suitable frame." A support may be connected to the vessel containing the matters to be treated on which the spindle may rest. The apparatus when constructed on a large scale is available for churning.

[Printed, 6*d*. Drawing.]

A.D. 1861, September 26.—N° 2411.

DAVIS, Robert.—(*Provisional protection only.*)—Churn.

Churns are constructed "of a cylindrical or circular form of "staves, disposed somewhat in the manner of barrel staves, "but having their ends rebated, which are received in circular "grooves formed in the wooden plates or surfaces forming "the ends of the churning vessel." This vessel is supported "on feet formed by projections of the end plates before-"mentioned, or on feet otherwise produced & in position so "that the axis is horizontal." It has a dasher of perforated wood mounted on a spindle turned by a winch handle. There is an opening with a suitable cover at the top.

[Printed, 4d. No Drawings.]

A.D. 1861, December 13.—N° 3139.

KELLY, JOHN.—(*Provisional protection only.*)—"Improvements in the treatment of milk for the manufacture of butter, & in apparatus for the same."

The milk is preserved in glass or earthenware vessels at a temperature of 52° for three or four days. These vessels are placed in metal pans which can be filled with water of the required temperature. The vessels are fitted with air-tight lids. The butter is made in a churn from which the buttermilk can be drawn off by a tap, and "the butter washed and purified from milk by cold spring water salted and made in the churn with very little manipulation."

[Printed, 4*d*. No Drawings.]

1862.

A.D. 1862, April 15.—N° 1093.

RAINS, RUPERT. — (*A communication from Georges Toselli.*)—(*Provisional protection only.*)—"Apparatus for freezing, cooling, and churning."

No improvements specially applicable for churning appear to be described.

The apparatus consists of a double cylindrical case mounted horizontally on pivots in a frame. Water is contained between the inner and outer shell, and freezing mixture in the inside. In the middle of the freezing mixture is placed a cylinder containing the matter to be treated. This cylinder is made in two parts, screwed together, and has a handle by which it can be rotated within the outer case.

[Printed, 4*d*. No Drawings.]

A.D. 1862, May 16.—N° 1480.

HASELTINE, GEORGE.—(*A communication from Sidney Sweet.*)—Churn.

The churn consists of a vessel of any suitable shape. The dasher is formed of a vertical rod working through a slot in the top of the churn, to which near its bottom are hinged two flaps, of shape to correspond with the inside of the churn. The movement of these flaps is controlled by a pair of cross-bars above and a bevelled block below them, carried by the vertical rod. Motion is given to the rod by a lever pivotted at one end to a bar projecting from the body of the churn and having a slot in it through which the rod passes. The rod is held in the slot by a pin passing through it and the lever.

[Printed, 8*d*. Drawing.]

A.D. 1862, June 14.—Nº 1768.

WILLIAMS, Thomas, and **COX**, Henry.—Churns, &c.

Several improvements in churns are described, amongst others a device for imparting motion to the churning apparatus. This is best described in the words of the inventors, as follows :—"To the axle an arm is attached, with a counter-" balance weight at its end, and to this axle we also attach " a crank handle, to which we likewise attach a lever or " connecting rod, secured at its other extremity to a bent " lever, which is centred on a pin or axle secured to the " outside of the case, and for convenience of working either " at the right or left hand. We prefer to have two of these " pins or axles secured to the case at opposite points " thereof, so that we can change the position of the bent " lever as required, this bent lever having at its free end " a proper handle, which is merely moved up and down (and " not turned) in order to work the machine, although the " crank handle aforesaid may be worked by an operator or " operators at the same time or independently, and will always " turn with the action of the lever as the axle and beaters " rotate, though the bent lever only moves up-and-down. " The counterbalance aforesaid is regulated in relative posi-" tion so as to assist the throw, and we prefer to have an " annulus or rim of a wheel attached thereto."

This apparatus is to be used to drive either of the three following churns.

1. The vessel for holding the cream is fixed, and has small chambers below it for holding hot or cold water. A beater is arranged diagonally across the vessel, consisting of a rectangular frame with a diagonal. This beater works on a pivot on one side, and has a projection on the other fitting a slot on the end of a short shaft projecting outside the vessel and driven as above. By drawing out the pivot, the beater can be removed.

2. A shaft fixed to the bottom of the vessel has on it a sleeve carrying beaters. By means of mitred gearing. the two are driven in opposite directions. The vessel is supported on a central pivot.

3. A hexagonal vessel is mounted in trunnions with its axis vertical. An endless band from a pulley on a shaft parallel to the axis drives a pulley fixed on one journal, and so rotates the vessel. A band from another pulley on the same shaft drives a pulley on a shaft passing into the vessel and actuating a beater which is connected thereto as in the churn first described. The beater is like a "paddle wheel with four or " more beater boards." There are projections attached to the sides of the vessel and to the lid, which forms one of its sides, and is secured by suitable catches.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1862, July 10.—N° 1987.

BONNELL, Ann.—(*A communication from William Bonnell.*) –(*Provisional protection only.*)—Churns.

Beaters are fitted on a shaft within a suitable vessel "in " such manner that they shall range as a twisted line or " thread of a screw, or an approximation thereto" One end of the shaft has a toothed wheel on it, and in the vessel are " projecting pieces running the whole length, and forming " what may be termed a series of steps." "Above these " beaters, at the end where the beater shaft protrudes, is a " circular core of zinc or other metal" "which has a hole " at the top, and withinside a number of projections or " corrugations, and in this circular case is a disc similarly " corrugated, which disc has an axis passing through the case, " having a toothed wheel outside; this toothed wheel and " the toothed wheel first described being driven by another " toothed wheel on a winch handle, such winch handle " being provided with arrangements for throwing the same " into and out of gear with the one wheel or the other, or " causing the whole three wheels to work together. The " case has a moveable top, and a plug to clear the churn, and " in the top is an orifice communicating with the aforesaid " circular case, fitting into which is a moveable feeding dish. " Into this the cream is poured, and the winch handle being " placed in gear with the axle of the circular case only is

" made to rotate, when the cream will be acted on by the " rotation of the disc therein."

"The cream thus acted upon exudes therefrom, and passes " into the churn, when the winch handle is thrown out with " the disc handle and into gear with the beater shaft, and " again turned, and when the churning is fully effected, it " may be cleaned out by pouring in warm water, and placing " the winch handle in gear with all the toothed wheels, " causing them to rotate, when the hot water can be passed " off by removing the plug aforesaid. The aforesaid circular " case arrangement may be made to work by the same shaft " as the beaters."

[Printed, 4*d*. No Drawings.]

A.D. 1862, October 1.—N° 2661.

CAMBRIDGE, William Colborne.—Apparatus for washing and churning.

As used for churning, the apparatus consists of a box resting on rockers, or mounted on trunnions in a frame, and worked by a handle at one end. The bottom inclines upwards at the ends, and is formed with a bridge or raised part in the centre. The ends, bottom and top are lined with corrugated zinc or other suitable metal, the corrugations being arranged across the direction of movement of the box. The ends of the zinc are secured by slips of wood, and the edges are driven slightly into the sides, to form a water-tight joint. The opening is in the centre of the top, and is closed by a suitable lid.

[Printed, 10*d*. Drawing.]

A.D. 1862, October 4.—N° 2686.

WATKINS, Francis.—"Apparatus for milking cows."

Four cups of vulcanised india-rubber and spiral wire, of a size each to fit one teat of a cow's udder, are attached to four short tubes leading to a vessel. The connection is effected by flanged rings fitting over the ends of the tubes and the flexible cups. This vessel is fitted with a flexible diaphragm at top, in the centre of which is a metal disc which can be operated by a lever handle. At the bottom of the vessel is a valve opening downwards. The apparatus thus forms a pump, as by raising the diaphragm the milk is drawn from the udder, and by compressing it, it is forced out through the valve below. The apparatus may be supported on a stand, or by an arm attached thereto, which is held or secured by a strap to the operator.

[Printed, 10*d*. Drawing.]

A.D. 1862, December 24.—N° 3441.

FAIRLESS, JOHN.—(*Provisional protection only.*)—"Ma-" chinery for milking cows."

The following is the whole Provisional Specification :—"My " apparatus consists of an elastic pipe connected with four " branches which fit on to the teats of the cow, the other ex- " tremity of the pipe or tube communicates with an air pump " which is contained in the lid of an ordinary milk can, the " lid being formed hollow for containing the necessary valves. " This air pump consists of a flat disc of vulcanized india- " rubber or other suitable material which is moved upwards " and downwards by means of a rod passing out through " the top of the milk can and actuated by a handle. The " action is as follows :—The air being exhausted from the " pipe or tube by means of the air pump, the milk runs into " the lid of the can, and by means of a valve opening out- " wards passes into the interior of the can. When no more " milk can be got, the extra pressure of the air causes it to " pass between the cones which fit on to the teats of the cow, " so that they can be easily detached."

[Printed, 4*d*. No Drawings.]

1863.

A.D. 1863, January 19.—N° 159.

LAURIE, JOHN. — (*Provisional protection only.*)— Churning.

The whole Provisional Specification runs as follows :—"I " place a shaft in a horizontal position outside a vessel of any " suitable shape or dimensions, and turn it by hand or power, " and I place inside the said vessel any convenient number of " dashers or beaters to revolve on bearings, motion being " given to them by wheel gearing connected to the hori- " zontal shaft, so that when it is turned the dashers revolve

" within each other and in opposite directions, thus causing
" great agitation of the liquid or mixture, and consequently
" an economization of time and labour."

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 15.—N° 943.

LEACH, JAMES.—Apparatus for washing, mangling, churning, &c.

The greater part of the Specification is taken up with descriptions of washing and mangling apparatus. The machine for churning consists of a barrel or other suitable vessel mounted on trunnions in a frame and revolved by any suitable means. It is divided transversely by a grating, the bars of which are arranged in one half in a direction at right angles to the direction of those in the other half, and they are set with their corners outwards. A pipe is fitted so as to admit air during the revolution of the barrel without allowing the cream to escape. It is open at one end to the air, it is then led down inside the barrel to the opposite side thereof, bent at right angles, and carried across the barrel and open to the interior.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1863, April 25.—N° 1044.

BARLAND, MARGARET.—(*A communication from Thomas Barland.*)—(*Provisional protection not allowed.*)—" Apparatus for milking cows."

A small tube is inserted into each teat of the udder, and the milk thus drawn off into a suitable vessel. The tubes are bluntly pointed at their ends and perforated there. If necessary an india-rubber ring may be used to surround the teat. A disc on each tube may prevent its being inserted too far. The cows may be made to stand "transversely across a trough" in which the milk vessels are placed. To avoid loss by spilling, the top of these vessels should be shaped like the cow's udder, and they should be placed in a raised position. Straps may be used to keep the cow in position. A tube may be used to carry off the contents of the various vessels to a common receptacle.

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 29.—N° 1082.

BARLAND, MARGARET, and MONCKTON, EDWARD HENRY CRADOCK.—(*Partly a communication from Thomas Barland.*)—Apparatus for milking cows.

A small tube is inserted into each teat of the udder, and the milk thus drawn off into a suitable receptacle. The tubes are bluntly pointed at their ends and perforated there. If necessary, an india-rubber ring may be used to surround the teat. A disc on each tube may prevent its being inserted too far. The cows may be made to stand "transversely across a trough" in which the milk vessels are set. To avoid loss by spilling, the top of these vessels should be shaped like the udder, and they should be raised. Straps may be used to keep the cow in position. A tube may be arranged to carry off the contents of the vessels to a common receptacle. The tubes may be made of any suitable material, and may be made of a coil of wire, or a piece of bent metal. A compress may be applied to the udder, to press out the milk, and elastic bands may be fitted to the teats to prevent the flow of milk at improper times. Any exhausting apparatus may be fitted to the tubes. To preserve milk unchanged it may be drawn by long tubes into bottles or exhausted receivers, so that it is kept from contact with the air during the milking process.

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 3.—N° 1660.

LELIOS, EVANGELI. — (*Provisional protection only.*) — Churning.

The object of the invention is to work a number of churns at once. One or more shafts furnished with tappets act on weighted rocking levers so as to raise and let fall the beaters of a series of churns. The shafting may be made in sections to be connected by clutches, so that any number required of the churns may be actuated simultaneously.

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 7.—N° 1688.

GEDGE, WILLIAM EDWARD.—(*A communication from Louis Grasset.*)—"Apparatus for milking."

A pump is attached to the top of a reservoir which has an opening closed with a screw plug, a tap for emptying the contents, a glazed opening in the side with a scale thereon, and a tap to which a flexible tube is attached. This tube ends in a small closed vessel or reservoir, to the top of which are connected four small tubes each fitted with a funnel to receive one teat of the cow. Each of these small tubes has a tap on it, and the large tube has a tap near the point where it joins the receiver. A partial vacuum is created in the receiver, the apparatus is attached to a cow, and the taps are all opened, by which means the milk is extracted.

[Printed, 10*d*. Drawings.]

A.D. 1863, August 14.—Nº 2011.

TAYLOR, Edward. — (*Provisional protection only.*) — Churning.

The Provisional Specification runs as follows :— "My in-
" vention consists in the employment and use of a rotating
" box, chamber, or receptacle of any suitable and required
" shape to contain the milk or cream to be churned, and so
" arranged that the centre of motion or rotation is eccentric
" to the central axis of the said box, by which means the milk
" or cream is dashed from end to end of the box as it rotates,
" causing great agitation or churning power, by which means
" the butter is produced. This may be effected by mounting
" the box at each end on a short stud or shaft, the central
" line or direction of which is diagonal or oblique to the
" central or parallel axis of the box, by which means an
" eccentric rotation is imparted thereto. The rotatory motion
" may be obtained by means of a curved link chain gearing
" with a pinion on the said diagonal shaft, which I prefer, or
" by ordinary gearing."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 8.—Nº 2465.

SMITH, Michael.—(*Provisional protection only.*)—"Wash-
" ing, cleansing, salting, and packing butter."

A box with a perforated bottom is supported in a vessel of water and the butter forced through the perforations by means of a presser plate and screw, &c. The butter is then salted and again forced through the perforations, but without using water. This is repeated as often as required. The butter is pressed or packed by pressure in the box on a solid bottom placed above the perforated one. The perforated bottom may be made of any suitable material.

[Printed, 4*d*. No Drawings.]

1864.

A.D. 1864, January 25.—N° 211.

BRADFORD, Thomas.—Washing, mangling, churning, &c.

The greater part of the Specification refers to apparatus for washing and mangling. As applied to churning the apparatus consists of a vessel of any convenient shape mounted on trunnions in a frame. It has a rotating or oscillating movement given to it by any suitable means. There is a lid at the top secured by "a lancewood spring." One or more "recessed, " bent, or 'lipped' boards are used to act as buckets" to raise the milk and let it pour off. In the drawing these boards are shewn affixed to the top of the vessel, or to the lid, at an inclination to it. In one of the figures two of these boards form a triangle, having their edges meeting. Air is admitted through openings in the lid and in one of these boards.

[Printed, 10*d*. Drawing.]

A.D. 1864, March 29.—N° 778.

BRADFORD, Thomas.—(*Provisional protection only.*)—" Churning and butter-making machines."

1. A "combination of tin, copper, or zinc, with wood veneer" is used in the construction of elliptical or circular churns, particularly such churns as those described in N° 211, A.D. 1864. No further description of this improvement is given.

2. A lid is used consisting of a "wood or metallic cover " with flange, having a groove immediately under it, and of a " smaller diameter than the part of such cover that is inserted " into the aperture;" in this groove is fitted an india-rubber washer. On the upper flange is a cross bar of lance-wood, the ends of which are held by set screws in the top of the vessel.

3. An apparatus for separating the butter and the buttermilk is described. An inclined board is forced by levers on the butter in a suitable trough. Printing devices may be attached to the presser-board.

[*Printed, 4d.* No Drawings.]

A.D. 1864, April 27.—N° 1052.

TAYLOR, Edward.—Apparatus for churning and washing.

A vessel of any suitable shape is pivotted excentrically in a frame so that its axis of rotation is diagonal to its own axis. Rotary motion may be given in any manner, but preferably by "a curved link chain gearing with a pinion on the said "diagonal shaft." The lid is secured by a cross-bar fixed thereon, the ends of which are slotted, and fit over headed screws so that by a half turn of these the bar and lid are held fast. Perforated balls may be placed in the vessel.

[Printed, 10*d*. Drawing.]

A.D. 1864, June 21.—N° 1542.

CARRINGTON, William, and TURNER, Thomas.—Churn.

Several varieties in the construction of churns are described.

1. A suitable vessel is pivotted in a frame from which rises a support carrying a handle and gearing for actuating the dasher. The dasher is fixed on a shaft which passes through the lid of the vessel. To a swivel on the top of this shaft the arm of a crank turned by a winch handle is attached. On the same crank-arm is a bevel wheel gearing with another on the shaft so that the shaft is rotated at the same time that it has an oscillating motion from the crank. The movements of the dasher are also partly shared by the vessel, as it is swung on pivots.

2. The vessel is stationary and the shaft of the dasher passes freely through a ball fitting in a socket in the lid. It can thus rise and fall, as well as oscillate in all directions.

3. Or, with a stationary vessel, the dasher shaft may have a rotary motion and a to-and-fro motion in a straight line. This is effected "by connecting to the crank a spur wheel gearing into "a stationary internal toothed wheel, the flange of which has "suitable hollows or breaks for allowing the passage of one of "the bevil wheels as the rod changes its motion." Other means of giving the required motion may also be used.

[Printed, 10*d*. Drawing.]

A.D. 1864, June 22.—N° 1558.

PUGH, Charles Henry.—"Apparatus used in the manufac-"ture of cheese."

The object of the invention is to provide a single apparatus capable of compressing the whey from the curd, and afterwards compressing the curd. A vessel is supported on a frame consisting of two uprights, connected by a cross-piece at top. The vessel turns on centres at the bottom, and can be fixed in an inclined or horizontal position. A perforated pressing plate is connected to a vertical rod, by which it is forced down, by a joint, which permits the plate to be fixed at right angles to the rod, or turned up parallel with the rod. "This is effected by " means of two palls on the bottom of the rod engaging with " teeth on the pressing plate." This rod may have a joint near its middle, so as to permit the upper part to be turned down. It passes through the cross beam at the top of the uprights. " A compound lever on the said cross piece is made to give " pressure to a pin fixed in a hole in the said rod, a series of " holes being provided in the rod, into any of which the said " pin may be placed to receive the pressure of the said lever. " A hanging weight supported by a chain gives pressure to the " compound lever described, and through the said lever and " rod to the pressing plate. A second weight and chain con" nected with the pressing plate raises the pressing plate " when the pressure of the compound lever is removed." Or a rack may be made on the rod, and a pall on the lever be made to engage therewith. The vessel has a false bottom, with a tap for drawing off water introduced to raise or lower the temperature. "The screw of the valve is connected with " the valve spindle by means of pins in the former taking into " a groove in the latter." The vessel has also valves above the false bottom for drawing off the whey. The curd is broken up by means of a series of "inclined knives" arranged helically on a shaft capable of rotation in a frame. "The appa" ratus may be used for pressing the curd into the vat in the " following manner:—The perforated pressing plate being " removed, another and smaller plate or block is substituted. " A frame ordinarily called a 'ladder' is placed horizontally " on the top of the vessel, and upon this the vat or vessel con" taining the curd to be pressed is placed. The pressing plate " or block is made to press the curd in the said vat or vessel " in the manner described with reference to the pressing of " the curd for the separation of the whey therefrom. Or the " *curd placed* in the vat or vessel may be pressed without re-

" moving the pressing plate by placing upon the said curd a " circular piece of wood commonly called a 'shooter' and " causing the pressing plate to descend upon it."

[Printed, 1*s*. Drawing.]

A.D. 1864, August 12.—Nº 2008.

HASELTINE, George.—(*A communication from Thomas Arnold Jebb.*)—Churn.

The churn described has a vertical shaft fitted with dashers and rotated by gearing on the top. Three tubes are fitted in the top, which reach down near to the bottom. They are secured by rings attached to the sides. Two of the tubes are closed at bottom and the third is open, they are all open above and fitted with funnels. The closed tubes contain water to raise or lower the temperature of the cream, and the open one serves to admit air into the middle of the cream. The lowest blade of the dasher works under the ends of the tubes and is longer than the others which work in the central space between them.

[Printed, 6*d*. Drawings.]

A.D. 1864, October 18.—Nº 2571.

REID, James.—(*Provisional protection not allowed.*)—Churns, &c.

The following is the Provisional Specification :—" This in- " vention consists in the use of a closed cylinder or drum " attached to and rotating with a central axis or shaft, round " the periphery of which are placed a number of buckets " or blades moving on hinges, and attached at their outer " extremities to links or arms connecting them with circular " discs by which their motions are regulated ; these circular " discs move round eccentric drums rigidly fixed. This in- " vention may be applied to the propulsion of machinery and " steam ships and other vessels, to the pumping of water, to " the churning of milk, and to like purposes."

[Printed, 4*d*. No Drawings.]

1865.

A.D. 1865, May 10.—N° 1292.

BRODERICK, William Edward.—(*A communication from Howard Tilden.*)—(*Provisional protection only.*)—Churns.

There is "an upright vessel to receive the cream" and a "perforated dasher which is moved upwards and downwards "by a hollow or air shaft to which it is attached." "This "shaft is provided with a valve or valves to control the air "within, and there is at its lower extremity an enlargement "or inverted cup which projects beneath the dasher" to prevent it striking against the bottom of the churn. In this cup are a number of "radial holes" to allow air to pass into the cream.

There are also "attached to the shaft or dasher, or both, "one or more wings or arms which can be made to gather "the butter by a rotary or semi-rotary motion" of the shaft.

[Printed, 4*d*. No Drawings.]

A.D. 1865, June 5.—N° 1535.

COOMBES, Philip. — Apparatus for separating whey from curd.

A pump of any suitable kind is fitted with wire gauze over the end of the suction pipe, or this pipe opens into a vessel of perforated material. The whole is fitted to a stand, so that it can be placed among the curd after the latter has been broken up, and the whey pumped off, The valves of the pump are all metal. By preference the barrel and suction pipe are copper, the rod and valves brass, the stand of galvanised iron, and the filter of copper or brass wire or hair. In using the apparatus, it is preferred to gather the curds to one side of the vessel, and place the pump in the whey at the other side.

[Printed, 10*d*. Drawing.]

A.D. 1865, June 28.—N° 1722.

PERCIVAL, William. — (*Provisional protection only.*)— Table for dressing cheeses.

The following is the Provisional Specification :—"My in"*vention* is designed for the purpose of expediting the final

" process of 'ironing,' binding, and cleaning the outer surfaces " of cheeses, by causing such processes to be performed with " greater ease and facility than hitherto.

"The improvements consist in the novel employment and " use of a stationary table or support supplied with a rotating " or moveable circular top, upon which the cheese to be operated upon is placed; this moveable top revolves upon a " central pin bedded firmly into the under or stationary table " during the time the above-mentioned processes are going " on, and is prevented from reversing its progress or revolution by means of a catch fixed to its under surface, acting " upon a circular rack firmly secured on the upper surface of " the under supporting or stationary table. The chief feature " of the invention being the construction of a table having a " circular rotating or moveable top or support for the cheese, " in contradistinction to having such tables fixed or stationary " as heretofore."

[Printed, 4*d*. No Drawings.]

A.D. 1865, Septmber 27.—N° 2471.

TAYLOR, JOHN.—Machines for washing and churning.

"A tub or reservoir is provided to contain the water or other " liquid to be agitated, that object being effected by means of " a cage or of a frame furnished with dashers" and "connected by means of a vertical axis or spindle with an archimedean screw, and actuated so as to have a rotary as well as " an upward and downward motion."

Several modifications are given of the way in which motion is imparted to the spindle. It may be worked up and down by a lever assisted by a spring, or rotated by bevel gearing worked by a lever, so that the motion is reciprocating. In either case the shaft passes through a screw nut in the cover, so that it has a secondary movement given it.

[Printed, 1*s*. Drawings.]

A.D. 1865, November 15.—N° 2936.

CLIFTON, HENRY.—"Making butter."

The object of the invention is to drive air into the cream in the process of churning. This may be done in any suitable manner, but two methods are preferred, of which one is figured and described at length. This consists in forming the dasher and staff of a vertical hand churn hollow and communicating with each other. The dasher is perforated, and there is a valve opening downwards at the top of the hollow staff, so that by each upward movement of the dasher, air is drawn into it which is expelled by the down stroke. According to the second modification, a rotary fan communicates by a pipe with the bottom of a receptacle for the cream, and the butter is produced by the effect of the air being driven through the cream.

[Printed, 6*d*. Drawing.]

1866.

A.D. 1866, March 16.—N° 786.

MANOCK, Thomas.—(*Provisional protection only.*)—" Apparatus to be employed in the manufacture of cheese."

In a suitable tub a false bottom is fitted, which can be raised by a chain wound on a pulley, a rack and pinion, or otherwise. The curd after most of the whey has been removed (preferably by the apparatus described in Coombes' Specification, No. 1535, A.D. 1865) is placed on the perforated bottom, and this is gradually wound up to the top of the vessel, thereby allowing the whey to run off. The curd is then placed in a cloth, and pressed between a presser plate and the perforated plate forming the false bottom above mentioned.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 28.—N° 1198.

BURNARD, George, and KOPPEL, Ludwig.—(*Provisional protection only.*)—" Apparatus for preserving milk and cream, " more especially designed for keeping milk fresh during " transport."

A number of metal tubes are fitted at their ends to a plate which can be secured to the lid of a milk can, or sustained on supports therein. These tubes contain ice. They are lined with flannel, &c. to hinder loss of heat, and have a receptacle fitted to them below to receive the water resulting from the melting of the ice. "On the exterior of the tubes a chamber is "formed, to contain" a "non-conducting chemical compound," preferably consisting of "equal quantities of salammoniac and "nitre." The tubes extend from the top about half way down the can.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 28.—N° 1205.

HOFFMAN, JOHN WILLIAM.—(*Provisional protection only.*) —Churns.

The following is the whole Provisional Specification:— "This invention consists in constructing churns with a cylin-"der or barrel of any suitable material fitted with a cover, "and also with an escape for the gas. The operation is "performed by beaters formed by preference of wire or of "perforated plates attached to a spindle which passes through "the head of the churn, and which spindle carries a toothed "pinion gearing into a toothed wheel, upon the spindle or "axis of which is fitted a crank handle, or for driving by "power a pulley or other available gear. Turning the toothed "wheel by means of the crank or other driving power causes "very rapid revolution of the pinion, and of the beaters upon "its spindle."

[Printed, 4*d*. No Drawings.]

A.D. 1866, May 14.—N° 1374.

NEWTON, WILLIAM EDWARD.—(*A communication from William Stuben de Zeng.*)—Barrels.

Barrels are constructed entirely of corrugated sheet iron. The cylindrical part is formed of sheets rivetted at the edges. The heads are stamped out in a press with a flange on them, and they fit inside the cylinder, "and rest upon the first of its "corrugations," the portion of metal extending beyond the head being turned down thereon. A hoop is fitted round each end. Bung or tap holes are formed by rivetting on rings in which are screwed holes to receive screw plugs. After completion the whole barrel is "galvanised" in a bath of melted zinc, &c. Milk cans, &c. may be constructed in a similar way.

[Printed, 6*d*. Drawing.]

A.D. 1866, June 13.—N° 1605.

LANCASTER, Robert.—(*Provisional protection only.*)—Lock for the lids of milk cans, &c.

The following is the whole Provisional Specification:—"My "invention is designed for the purpose of locking or securing "the lids or covers of milk cans, boxes, trunks, or other similar "receptacles, and consists in the novel employment and use "of a latch or catch lever contained in a small box, one being "secured on each side of the can or other receptacle in such a "position that a spring contained in the said box actuating "the latch will allow them to overlap or catch the ledge of the "lid or cover of the can to which they are attached. When "the lid is forced down and so as to be caught and held by "the latches, they may be retained in that position so as to "form a lock or fastening, and this may be effected by a "sliding bolt actuated by a key, the said bolt when 'forced' "forming a stay to the lever, which will prevent it being "forced back until the bolt is withdrawn, or the same may be "effected by a screw abutment or other equivalent as "desired."

[Printed, 4*d*. No Drawings.]

A.D. 1866, June 14.—N° 1614.

MORRIS, Ellis.—(*Provisional protection only.*)—Churning.

The whole Provisional Specification is as follows:—"This "invention consists in certain arrangements of apparatus and "mechanism whereby the operation of churning can be per-"formed with great facility and economy of labour. The "apparatus is used in connection with the ordinary upright "churn, any such churn being capable of being operated "thereby. A frame is constructed for the purpose of sup-"porting the mechanism by which the beater of the churn is "actuated. The beater is attached to one end of a lever "which is centred upon a cross bar of the frame as a fulcrum, "such lever being actuated by a double crank arrangement "driven by two treddles, which are worked by the operator, "for whom a seat is provided at the end of the frame. The "axis of the crank is furnished with a fly wheel, and the "stroke of the lever attached to the beater can be adjusted to "any desired length by altering the relative position of the

" fulcrum of the former and the distance of the connecting " rod from the axis of the crank. The apparatus is fixed to a " bed plate, to which any ordinary upright churn may be " suitably secured and actuated as before mentioned, and the " bed plate being provided with wheels, rollers, or castors, is " readily moved from place to place as may be desired."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 2.—N° 2000.

AVERY, JOHN GILBERT.—(*A communication from Leander Langdon.*)—(*Provisional protection only.*)—Churn.

Dashers are arranged upon a central shaft within a vessel in such a manner that they may form two screws thereon, those on one half of the shaft acting in one direction, and those on the other half in the other direction, so that by rotating the shaft in one direction the butter is driven towards the centre, and by rotating it in the other direction it is driven outwards. There is a space in the middle of the shaft on which there are no dashers, to allow the butter to collect there. "The lower " corners of the box or case are filled up with a series of " projecting ledges or breakers." There is a lid with a glazed opening, and in the lid are openings to admit air. To prevent the escape of cream, these openings are fitted with tubes. One of these openings is at each end of the lid, and there are others in the centre. One end of the shaft passes through the side of the box and is secured by nuts; to the other end gearing is connected by which it is driven.

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 25.—N° 2198.

HASELTINE, GEORGE.—(*A communication from Sylvester Franklin Schoonmaker.*)—(*Provisional protection only.*)—Churn.

The churn consists of a cylindrical vessel with a central vertical spindle, driven by a handle on top, and carrying beaters. At the bottom of the shaft are fixed a set of radial tubes, open at both ends, but with the orifices at the centre smaller than those at the outer ends. "Other tubes are " connected to these horizontal tubes, and extend upward " therefrom by the size of the upright shaft, by which they

" are supported in small sockets," or otherwise, so as to be removeable for cleaning. It is stated that by the action of these tubes as they revolve, air is drawn down and mingled with the cream.

Round the inside of the vessel a series of upright bars is fitted to act as "breakers." They are "arranged in pairs" " one of each pair being fixed close to the surface of the " cylindrical vessel, and the other a little towards the centre " thereof."

[Printed, 4*d*. No Drawings.]

A.D, 1866, September 27.—N° 2500.

SLATER, George.—Churn.

The dasher of a churn is constructed "in the form of a screw " propeller." The axis may be either vertical or horizontal. In the latter case the body of the churn is preferably cylindrical below and rectangular above. The lid is formed with air-holes at the ends and in the middle, and there is a glazed aperture for watching the process. The air-holes may be fitted with valves. The screw is preferably in two parts, one right-handed and the other left-handed, and there is a space between them in which is a breaker fixed to the side of the vessel. The shaft and the blades of the screws may have ribs on them. The shaft works at one end on the point of a set screw fitted through the end of the vessel, at the other it fits on the end of a short spindle which passes through the end of the vessel and has on it a pinion engaging with a cog-wheel turned by a winch handle.

[Printed, 8*d*. Drawing.]

A.D. 1866, November 29.—N° 3142.

VON LERSNER-EBERSBURG, Elise.—(*A communication from Baron Justus von Liebig.*)—(*Provisional protection only.*)—" Concentrated milk."

The following is the Provisional Specification :—" A certain " quantity of wheat flour and fresh cow's milk is boiled for a " few minutes, then allow the temperature to sink to 150° " Fahrenheit, and add a certain quantity of malt, bicarbonate " of potash, and water ; keep this mixture for one hour and " a half at a degree of heat equivalent to 150° Fahrenheit ;

" then boil again for a few minutes, and strain through a fine " hair sieve.

" Ingredients.

720	parts of	wheat flour.
720	,,	malt.
21¾	,,	bicarbonate of potash.
1,440	,,	water.
12,458¼	,,	fresh cow's milk."

[Printed, *4d.* No Drawings.]

APPENDIX.

A.D. 1844, November 2.—Nº 10,374.

SMITH, Charles. — " New and improved methods in the " construction of and application of a variety of cooking, " culinary, and domestic articles and utensils, some of which " are applicable to cleaning and a variety of similar useful " purposes."

Two of the numerous divisions of this Specification refer to the present series.

1. Milk pans may be made of "sheet iron, tin, zinc, or other " metal, with a double bottom and a strata of sand between " them."

2. A churn is described. It is conical in form. The dasher is composed of a rod with a ball fixed thereon, which ball fits in a socket on the top. The lower end of the rod is fitted with a second ball which travels over the bottom of the churn when a rotary motion is imparted to the upper portion of the rod. The bottom of the churn is fitted round its edge with " a tongue for making the vessel liquor-tight, which passes " into a groove " in the edge of the sides.

The Specification consists of 52 pages, and the inventions are ranged under 20 different heads. There are four large sheets of drawings containing over 250 separate figures.

[Printed, *4s. 6d.* Drawings.]

A.D. 1846, March 25.—Nº 11,149.

SMITH, Charles. "Improvements in cooking and culinary "utensils, and methods of heating and suspending or fastening "articles of domestic use and similar purposes."

Among the numerous and diverse inventions included in this Specification is a method of sealing the lids of vessels by a water joint or a joint in which "dry powder, such as flour, "meal, whiting, general burnt or other clays or similar "earths, sills," "or water or other liquid" is used. The lids of milk pans may be thus secured. One is figured in which the edge of the lid fits in a groove in the rim of the pan, this groove being filled with water. There is a hole stopped by a cork in the groove at one side, and through this the water can be poured away before the can is emptied of the milk.

The Specification consists of 46 pages. There are four sheets of drawings, containing nearly 200 figures.

[Printed, 8s. 0d. Drawings. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 356.]

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ERRATUM.

Page 31 line 22, *for* "MAGGS, OLIVER," *read* "MAGGS, Oliver."

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Brighton (*Town Hall*).
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Bury.
Carlisle (*Public Free Library, Police Office*).
Cork (*Royal Cork Inst^{n}, Nelson Place*).
Crewe (*Railway Station*).
Darlington (*Mechanics' Institute, Skinnergate*).
Derby (*Free Public Library*).
Dorchester.
Drogheda.
Dublin (*Royal Dublin So^{y}, Kildare St.*)
Dundalk (*Free Library*).
Falmouth (*Public Lib^{y}, Church St.*).
Gateshead (*Mechanics' Institute*).
Gorton (*Railway Station*).
Glasgow (*Stirling's Lib^{y}, Miller St.*).
Grimsby, Great (*Mechanics' Institution, Victoria Street*).
Halifax.
Hertford (*Free Public Library, Town Hall*).
Huddersfield (*Improvement Commissioners' Offices, South Parade*).
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Kidderminster (*Public Free Library, Public Buildings, Vicar Street*).
Lancaster (*Mechanics' Institute, Market Street*).
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Manchester (*Free Liby., Camp Field*).
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Norwich (*Free Library, St. John's, Maddermarket*).
Nottingham (*Free Library*).
Oldham (*School of Arts and Sciences, Lyceum*).
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Plymouth (*Mechanics' Institute, Princess Square*).
Preston, Lancashire (*Dr. Shepherd's Library, the Institution, Avenham*).
Reading (*Literary, Scientific, and Mechanics' Institution, London St.*)
Rochdale (*Free Public Library, Town Hall*).
Rotherham (*Board of Health Offices Howard Street*).
Salford (*Royal Museum and Library, Peel Park*).
Sheffield (*Free Public Library, Surrey Street*).
Southampton (*Hartley Institution*).
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Stockport (*Museum, Vernon Park*).
Sunderland (*Corporation Museum, Athenæum, Fawcett Street*).
Wakefield (*Mechanics' Institution, Barstow Square*).
Warrington (*The Museum and Library*).
Waterford (*Town Hall, The Mall*).
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Newfoundland.
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New Zealand.
Nova Scotia.
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Victoria—Parliamentary Library, Melbourne.
  Patent Office, Melbourne.
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  Musée de l'Industrie, Brussels.
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  Conservatoire des Arts et Métiers, Paris.
Germany—Alsace—Société Industrielle, Mulhouse.
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  Prussia—Königliche Polytechnische Schule, Aix-la-Chapelle.
    Gewerbe-Akademie, Berlin.
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  Saxony—Polytechnische Schule, Dresden.
  Wurtemberg—Bibliothek des Musterlagers Stuttgart.
Italy—Ufficio delle Privative, Rome.
Netherlands—Harlem.
Russia—Bibliothèque Impériale, St. Petersburg.
Spain—Madrid.
Sweden—Teknologiska Institutet, Stockholm.
United States—Patent Office, Washington.
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  Free Public Library, Boston.
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Ashby-de-la-Zouch (*Mutual Improvement Society*).
Ashton-under-Lyne, (*Mechanics' Institution*).
Bacup (*Mechanics' Institution*).
Ballymoney (*Town Hall*).
Banbridge (*Literary and Mutual Improvement Society*).
Banbury (*Mechanics' Institution*).
Barnstaple (*Literary and Scientific Institution*).
Bath (*Athenæum*).
—— (*Royal Literary and Scientific Institution*).
Batley (*Mechanics' Institution*).
Battle (*Young Men's Christian Association*).
Belfast (*Athenæum*).
—— (*People's Literary Institute*).
Berkhampstead, Great (*Mechanics' Institute*).
—— (*Working Men's College*).
Birkenhead (*Literary and Scientific Society*).
Birmingham (*Bloomsbury Institution*).
—— (*Central Lending Library*).
—— (*Deritend Working Men's Association*).
—— (*Free Library and News Room, Gosta Green.*)
—— (*Graham Street Institution*).
—— (*Gun Makers' and Inventors' Club*).
—— (*Law Students' Society.*)
Bodmin (*Literary Institution*).
Bolton (*Mechanics' Institute*).
—— (*School of Art*).
Bournemouth (*Library and Reading Room*).
Bradford, Yorkshire (*Church Institute*).
—— (*Library and Literary Society*).
—— (*Mechanics' Institute*).
Braintree (*Braintree and Bocking Literary and Mechanics' Institution*).
Brampton, near Chesterfield (*Local Museum and Literary Institute*).
Breage, Cornwall (*Institution*).
Bristol (*Athenæum*).
—— (*Institution*).
—— (*Law Library Society*).
—— (*Library*).
Bromsgrove (*Literary and Mechanics' Institute*).
Burnley (*Literary Institution*).
—— (*Mechanics' Institution*).
Burslem (*Wedgwood Institute*).
Bury (*Athenæum*).
Bury St. Edmund's (*Athenæum*).
—— (*Mechanics' Institution*).
Calne (*Literary Institution*).
Canterbury (*Working Men's Club*).
Cardigan (*Mechanics' Institute*).
Carharrack (*Literary Institute*).
Carmarthen (*Literary and Scientific Institution*).
Cheddar (*Literary Institution*).
Cheltenham (*Literary and Philosophical Society*).
—— (*Permanent Library*).
—— (*Working Men's Club*).
Chertsey (*Literary and Scientific Institution*).
Chester (*City Library and Reading Room*).
Chesterfield (*Mechanics' Institution*).
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Coggeshall (*Literary and Mechanics' Institution*).
Colchester (*Literary Institution*).
—— (*Young Men's Christian Association*).
Compstall (*Athenæum*).
Coventry (*Free Library*).
—— (*Institute*).
—— (*School of Art*).
Crediton (*Working Men's Club*).
Crewe (*Mechanics' Institution*).
Dartmouth (*Mutual Improvement Society*).
Deal (*Deal and Walmer Institute*).
Denton (*Denton and Haughton Mechanics' Institution*).
Derby (*Mechanics' Institution*).
Devouport (*Mechanics' Institute*).
Dewsbury (*Mechanics' Institution*).
Diss (*Reading Room and Library*).
Doncaster (*Free Library*).
—— (*Great Northern Mechanics' Institute*).
Dorchester (*County Museum and Library*).
—— (*Working Men's Institute*).
Dudley (*Mechanics' Institution*).
Dukinfield (*Village Library and Reading Room*).
Dumbarton (*Philosophical and Literary Society*).
Dumfries (*Mechanics' Institution*).

[illegible] Chamber of Commerce and
Reading Room.
[illegible] Mechanics' Institution).

London (*Albert Working Men's Club, Knightsbridge*).
——— (*Bank of England Library and Literary Association*).
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——— (*Southwark Working Men's Club, Broadwall, Stamford Street*).
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——— (*Working Men's Club, St. Mark's, Victoria Docks*).
——— (*Working Men's Club and Institute, Battersea*).
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——— (*Working Men's College, Great Ormond Street*).
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Lymington (*Literary Institute*).
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Maidstone (*St. Paul's Literary Institute*).
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Manchester (*Ancoats Branch Free Library*).
——— (*Athenæum*).
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——— (*Working Men's Hall*).
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Newcastle-upon-Tyne (*Mechanics' Institution*).
——— (*Working Men's Club*).
New Mills, near Stockport (*Mechanics' Institute*).
Newport, Isle of Wight (*Young Men's Society and Reading Room*).
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Nottingham (*Free Library*).
——— (*Mechanics' Institution*).
——— (*Subscription Library, Bromley House*).
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Oldham (*Analytic Literary Institution*).
——— (*Mechanics' Institution, Werneth*).
Ormskirk (*Public Library*).
Oswestry (*Institute*).
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Patricroft (*Mechanics' Institution*).
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Penryn (*Working Men's Club and Reading Room*).
Perth (*Mechanics' Library, High Street*).

Peterborough (*Mechanics' Institution*).
Plymouth (*Working Men's Institute*).
Pontypool (*Literary Institute*).
Poole (*Literary and Scientific Institution*).
—— (*Mechanics' Institute*).
Port Glasgow (*Public Library*).
Portsea Island (*Young Men's Christian Association*).
Preston (*Institution for the Diffusion of Knowledge*).
Reigate (*Mechanics' Institution*).
Retford (*Literary and Mutual Improvement Society*).
Richmond (*Working Men's College*).
Rotherham (*Rotherham and Masbro' Literary and Mechanics' Institute*).
Royston (*Institute*).
Ryde, Isle of Wight (*Philosophical and Scientific Society*).
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Saffron Walden (*Literary and Scientific Institution*).
St. Just (*Institution*).
St. Leonard's (*Mechanics' Institution*).
Salford (*Working Men's Club*).
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Shaftesbury (*Literary Institution*).
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Swansea (*Royal Institution of South Wales*).
——— (*Working Man's Institute*).
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Thornton Heath, Croydon (*Workmen's Club*).
Todmorden (*Mechanics' Institution.*)
Truro (*Cornwall County Library*).
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Tunbridge (*Literary and Scientific Institute*).
——— (*Mechanics' Institute.*)
Tunbridge Wells (*Mechanics' Institution*).
———— (*Society of Literature and Science*).
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Uttoxeter (*Mechanics' Literary Institute*).
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Walsall (*Free Library*).
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Ware (*Institute*).
Warminster (*Athenæum*).
Watford (*Literary Institute*).
Wells, Somerset (*Mechanics' Institution, Grove Lane*).
———— (*Young Men's Society*).
Whaleybridge (*Mechanics' Institute*).
Whitby (*Institute*).
——— (*Museum*).
——— (*Subscription Library*).
Whitehaven (*Mechanics' Institute*).
——— (*Working Men's Reading Room*).
Whitstable (*Institute*).
Wilton (*Literary Institute*).
Winchester (*Mechanics' Institution*).
——— (*Training College*).
Wirksworth (*Mechanics' Institution*).
Wisbeach (*Mechanics' Institute*).
Witham (*Literary Institution*).
Witney (*Athenæum*).
Wolverhampton (*Law Library*).
———— (*Library*).
Wolverton (*Institute*).

Woodbridge (*Literary and Mechanics' Institute*).
——— (*Working Men's Hall*).
Worcester (*Railway Literary Institute*).
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——— („ „ *Inner Temple.*
——— („ *Lincoln's Inn*).
——— („ „ *Middle Temple*)
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——— (*Odontological Society*).
——— (*Royal Society*).
——— (*United Service Museum*).
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——— (*Mechanics' Institution, David Street*).
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Swindon, New (*Mechanics' Institute*).
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British Colonies and Foreign States.

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